FINAL

ANG/CEVR
INSTALLATION RESTORATION PROGRAM
SITE 2 REMOVAL ACTION PLAN (RAP)

STATE COLLEGE AIR NATIONAL GUARD STATION

Prepared For:
ANG/CEVR
3500 Fetchet Avenue
Andrews AFB, Maryland 20762-5157

Prepared By:
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The purpose of this design document is to present the removal action proposed for Site 2 (Sump/Dry Well of the Pennsylvania Air National Guard Station (PaANG) at State College in Pennsylvania. The removal action, as presented herein, will be undertaken by the PaANG. This design document provides information on the remediation goals, scope of operation, associated plans, and design drawings with specifications necessary for the implementation of this effort.

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PARSONS ENGINEERING SCIENCE, INC.

290 Elwood Davis Road, Suite 312 • Liverpool, New York 13088 • (315) 451-9560 • Fax (315) 451-9570

December 19, 1997

Mr. Winston K. Crow
Project Manager
Installation Restoration Program
ANG/CEVR
3500 Fetchet Avenue
Andrews AFB, MD 20762-5157

RE: Final Site 2 Removal Action Plan
State College Air National Guard Station
IRP Site 2 - Sump/Dry Well
Contract No. DAHA90-94-0010
Delivery Order 0019

Dear Mr. Crow:

Attached for your use are three copies of the Final Site 2 Removal Action Plan for the State College Air National Guard Station, State College, Pennsylvania. We are also sending one unbound and seven bound copies to Major Tatro, four copies to Master Sergeant Koshute, and one copy to Mr. Randy Farmerie (PADEP), as required in the Statement of Work.

If you have any questions or need additional information, please contact Ed Roberts or myself at (315) 451-9560, extensions 2165 and 2160, respectively.

Sincerely,

PARSONS ENGINEERING SCIENCE, INC.

Peter M. Petrone, P.E.
Project Manager

cc: R. Tatro, 193rd SOW/EM (8 copies)
J. Koshute, 112th TCS St. Col. (4 copies)
R. Farmerie, PADEP (1 copy)
M.A. Burke, NGB-AQC-E (Letter)

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DECEMBER 1997

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TABLE OF CONTENTS

TABLE OF CONTENTS (CONTINUED)

LIST OF APPENDICES

TABLE OF CONTENTS (CONTINUED)

LIST OF FIGURES

LIST OF TABLES

ENGINEERING DRAWINGS

Drawing No.	Title
G-1	Cover Sheet and Drawing Index
G-2	Existing Site Plan and Location Map
G-3	Soil/Sediment Removal Plan and Details

EXECUTIVE SUMMARY

The purpose of this design document (Removal Action Plan) is to present the removal action proposed for Site 2 of the Pennsylvania Air National Guard Station (PaANG) at State College in Pennsylvania. This design document provides information on the remediation goals, scope of operation, associated plans, and design drawings (Drawing No. G-1, C-1, C-2) with specifications (i.e., construction notes on the drawings) necessary for the implementation of this effort.

The PaANG recommended and PADEP approved removal alternative to mitigate contaminated sediment and soil at Site 2 is Alternative 4 - Removal and Treatment or Disposal, as presented in the Engineering Evaluation/Cost Analysis (EE/CA) includes the following project activities:

- Mobilization and demobilization of the remediation contractor (personnel, materials and equipment) to and from Site 2;
- Site preparation will include erosion and sedimentation control measures that will be carefully and vigorously implemented. Site preparation will also include the removal of a section of the security fence prior to the construction activities to allow for the freedom of movement of equipment at Site 2;
- Site 2 will be cleared of equipment and vehicles and the asphalt and concrete surface layers will be saw cut and removed via conventional excavation equipment;
- Exposed sediment and soil will be excavated, temporarily stockpiled and dewatered, if necessary, and transported via 25- to 30-ton haul trucks to an offsite permitted facility for treatment or disposal;
- The type of offsite treatment and/or disposal option selected will be based on the results of the required sampling and analytical testing prior to shipment of the material. The offsite treatment and disposal options under consideration are recycle/reuse, solid waste landfill, or hazardous waste landfill (if the analytical testing deems the material to be characteristically hazardous);
- Following the excavation of soil and sediment and the achievement of the cleanup criteria, the excavation will be backfilled with clean fill; and
- Restoration of asphalt and concrete will include the replacement in kind (estimate of six inches of asphalt or concrete and 12 inches of gravel subbase).

NATIONAL GUARD BUREAU
LIST OF ACRONYMS AND ABBREVIATIONS

ACM	Asbestos Containing Material
A-E	Architect-Engineer
AFB	Air Force Base
AGE	Aerospace Ground Equipment
AHERA	Asbestos Hazard Emergency Response Act
AMSL	Above Mean Sea Level
ANG	Air National Guard
ANGRC	Air National Guard Readiness Center
AOC	Areas of Concern
AQC-E	Acquisition Contracting Division
ARARs	Applicable or Relevant and Appropriate Requirements
ARNG	Army National Guard
ATCF	Air Traffic Control Flight
BACT	Best Available Control Technology
BAT	Best Available Technology
BD	Business Development
BD/DR	Building Demolition/Debris Removal
BGS	Below Ground Surface
BMP	Best Management Practice
BRAC	Base Realignment and Closure
CAS	Contract Administrative Summary
CDAP	Chemical Data Acquisition Plan
CELT	NGB Commanders Environmental Leadership Training
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CLEAN	Comprehensive Long-term Environmental Action, Navy
CLIN	Contract Line Item Number

NATIONAL GUARD BUREAU
LIST OF ACRONYMS AND ABBREVIATIONS
(CONTINUED)

CLP	Contract Laboratory Program
CMI	Corrective Measures Implementation (RCRA)
CMS	Corrective Measures Study (RCRA)
COC	Compounds of Concern
COE	Corps of Engineers
CON/HTW	Containerized Hazardous and Toxic Waste
CONUS	Continental United States
COR	Contracting Officer's Technical Representative
CPFF	Cost Plus Fixed Fee
CSMs	Conceptual Site Models
DCAA	Defense Contract Audit Agency
DERA	Defense Environmental Restoration Account
DERP	Defense Environmental Restoration Program
DFAR	Defense Federal Acquisition Regulations
DFR	Daily Field Report
DHMT	DOT Hazardous Materials Training
DLA	Defense Logistics Agency
DNAPLs	Dense Non-Aqueous Phase Liquids
DOD	Department of Defense
DPM	Defense Priority Model
DQOs	Data Quality Objectives
DRMO	Defense Reutilization and Marketing Office
EA	Environmental Assessment
EBS	Environmental Baseline Studies
ECAMP	Environmental Compliance Assessment Management Program
EE/CA	Engineering Evaluation/Cost Analysis
EIAP	Environmental Impact Analysis Process
EIS	Environmental Impact Statement
EMTCE	Environmental Management Training - Continuing Education

NATIONAL GUARD BUREAU
LIST OF ACRONYMS AND ABBREVIATIONS
(CONTINUED)

EMTI	Environmental Management Training - Initial
EOD	Explosive Ordinance Disposal
EPA	Environmental Protection Agency
FAC	Functional Area Chief
FAR	Federal Acquisition Regulations
FEMA	Federal Emergency Management Agency
FFP	Firm Fixed Price
FI	Field Investigation
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FIRMs	Flood Insurance Rate Maps
FS	Feasibility Study
FUDS	Formerly Used Defense Sites
GAC	Granular Activated Carbon
GC	Gas Chromotograph
GFP/GFE	Government Furnished Property/Equipment
GWAT	Groundwater Monitoring
HASP	Health and Safety Plan
HAZD	Hazardous Waste
HAZMN	Hazardous (waste) Minimization
HAZWRAP	Hazardous Waste Remedial Action Program
HQ	Headquarters
HRS	Hazard Ranking System
HTW	Hazardous and Toxic Waste
HTRW	Hazardous, Toxic, and Radioactive Waste
HWM	Hazardous Waste Management
IAG	Interagency Agreement
IDO	Indefinite Delivery Order
ILUMP	Integrated Land Use Management Plan
IPR	Individual Performance Report

NATIONAL GUARD BUREAU
LIST OF ACRONYMS AND ABBREVIATIONS
(CONTINUED)

IRA	Interim Remedial Action
IRP	Installation Restoration Program
IRPIMS	Installation Restoration Program Information Management System
IWTP	Industrial Wastewater Treatment Plant
JTR	Joint Travel Regulations
LISI	Hazardous Waste Delisting
LNAPLs	Light Non-Aqueous Phase Liquids
LUST	Leaking Underground Storage Tank
MAP	Management Action Plan
MCL	Maximum Contaminant Level
MGD	Million Gallons Per Day
MIS	Management Information Systems
M&R	Maintenance and Repair
MRR	Material Receiving Report
MSC	Medium-Specific Concentrations
NAAQS	National Ambient Air Quality Standards
NCP	National Oil and Hazardous Substances Contingency Plan
NEPA	National Environmental Policy Act
NGB	National Guard Bureau
NIOSH	National Institute of Occupational Safety & Health
NPDES	National Pollution Discharge Elimination System
NPL	National Priorities List
NTP	Notice to Proceed
ODC	Other Direct Cost
OEW	Ordinance and Explosive Waste
OHW	Other Hazardous Waste
OMA	Operation and Maintenance Account
OSHA	Occupational Safety and Health Administration
OSWER	USEPA Office of Solid Waste and Emergency Response

NATIONAL GUARD BUREAU
LIST OF ACRONYMS AND ABBREVIATIONS
(CONTINUED)

Parsons ES	Parsons Engineering Science, Inc.
PA	Preliminary Assessment
PaANG	Pennsylvania Air National Guard
PADEP	Pennsylvania Department of Environmental Protection
PAHs	Polynuclear Aromatic Hydrocarbons
PAS	Pre-award Survey
PCB	Polychlorinated Biphenyl
PCE	Tetrachloroethylene
PCP	Project Control Plan
PennDOT	Pennsylvania Department of Transportation
PM	Project Manager
PMP	Program Management Plan *or* Project Management Plan
PMT	Pest Management Training
PNR	Project Number Request
POC	Point of Compliance or Contact
POTW	Publicly Owned Treatment Works
PPA	Pollution Prevention Act
PPE	Personal Protective Equipment
PPPS	Pollution Prevention Program Study
PRG	Preliminary Remediation Goal
PRP	Potentially Responsible Party
PSU	Pennsylvania State University
QA/QC	Quality Assurance/Quality Control
QAE	Quality Assurance Evaluator
QAPP	Quality Assurance Project Plan
R&A	Relevant and Applicable
RA	Remedial Action
RAC	Response Action Contractor
RACT	Reasonably Available Control Technology

NATIONAL GUARD BUREAU
LIST OF ACRONYMS AND ABBREVIATIONS
(CONTINUED)

RAO	Remedial Action Objective
RBC	Risk-Based Concentrations
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
REMA	Remedial Action
REMD	Remedial Design
RFA	RCRA Facility Assessment
RFI	RCRA Facility Investigation
RFP	Request for Proposal
RFQ	Request for Quotation
RI	Remediation Investigation
RMVA	Removal Action
ROD	Record of Decision
SAP	Sampling and Analysis Plans
SARA	Superfund Amendments and Reauthorization Act of 1986
SB/SDB	Small Business/Small Disadvantaged Business
SHS	Statewide Human Health Standards
SI	Site Investigation
SOW	Scope of Work
SPCC	Spill Control and Countermeasures Plan
SPR	Spill Prevention and Response Plans
SRAP	Source Removal Action Plan
SRE	Streamlined Risk Evaluation
STP	Sewage Treatment Plant
SVE	Soil Vapor Extraction
SVOC	Semi-volatile Organic Compound
SWDA	Solid Waste Disposal Act
SWMU	Solid Waste Management Unit
SWOB	Small Women Owned Business

NATIONAL GUARD BUREAU
LIST OF ACRONYMS AND ABBREVIATIONS
(CONTINUED)

TCE	Trichloroethene
TCL	Toxic Compound List
TCLP	Toxicity Characteristic Leaching Procedure
TCS	Tactical Control Squadron
TEPS	Total Environmental Program Support
TEC	The Environmental Company (Parsons ES Subcontractor)
T&M	Time and Materials
TSCA	Toxic Substance Control Act
UFPO	Underground Facilities Protection Organization
USCG	U.S. Coast Guard
USEPA	United States Environmental Protection Agency
USPFO	U.S. Property and Fiscal Office
UST	Underground Storage Tank
UXO	Unexploded Ordnance
VOC	Volatile Organic Compound

SECTION 1

INTRODUCTION

1.1 PURPOSE AND SCOPE OF THE REMOVAL ACTION DESIGN

The purpose of this design document (Removal Action Plan) is to present the removal action proposed for Site 2 of the Pennsylvania Air National Guard Station (PaANG) at State College in Pennsylvania. PaANG is presently leasing the property (station) from the Pennsylvania State University (PSU). The removal action, as presented herein, will be undertaken by the PaANG. This design document provides information on the remediation goals, scope of operation, associated plans, and design drawings (Drawing No. G-1, C-1, C-2) with specifications (i.e., construction notes on the drawings) necessary for the implementation of this effort.

1.2 SITE SPECIFIC REMOVAL ACTION OBJECTIVES, SCOPE, SCHEDULE

1.2.1 Removal Action Objectives and Scope

The site specific removal action objectives (RAOs) are based on achieving specific cleanup criteria confirmed by PADEP during the EE/CA and Removal Design (RD) kickoff meeting on November 19, 1996, while working within the statutory limits and attaining compliance with applicable, relevant and appropriate requirements (ARARs) to the extent practicable.

As presented in the streamlined risk assessment of the EE/CA, there is no present threat to the public health, welfare, and environment at Site 2. However, it is the Air National Guard's position that leaving Site 2 in its current condition, following the relocation of the PaANG at State College to its new location, could pose a potential threat because the National Guard would no longer have control over land use at the site (Parsons ES, 1997b). Potential future receptors could be exposed to contaminated soil and sediment at Site 2 through excavation.

The maximum detected concentrations in soil and sediment at Site 2 were compared to the PADEP Act 2 (August 1997) Statewide Health Standards residential medium-specific concentrations (direct contact soil MSCs and soil-to-groundwater MSCs), if available, otherwise the USEPA Region III residential risk-based concentrations (RBCs) were used. Based on the fact that twelve constituents were detected at maximum concentrations exceeding these criteria (Table 1.1), a non-time-critical removal action is warranted (USEPA, 1993). Therefore, the removal action objectives that the remediation contractor will be required to achieve include the following:

- Clean up (remove) source material to residential MSCs, where available, or to USEPA Region III residential RBCs;
- Provide short-term and long-term protection of human health and the environment;
- Mitigate the potential for exposure of future receptors to the contaminated soil and sediment through excavation; and
- Comply with USEPA Guidance on Conducting Non-Time-Critical Removal Actions under CERCLA (USEPA, 1993).

1.2.2 Removal Action Schedule

The general schedule for the removal action to be conducted at Site 2 of the PaANG Station at State College in Pennsylvania, consists of the activities leading up to the actual remediation, the approximate start and completion dates for the field effort including site preparation through site restoration, and the closure report. The approximate general schedule for the removal action is summarized in Table 1.2.

1.3 RAP STRUCTURE

Section 1	Introduction - provides the purpose and scope of the project and removal action objectives.
Section 2	Site Background - provides a description and history of the Site 2.
Section 3	Project Organization - includes a discussion of the project team.
Section 4	Removal Action Program - describes the removal action program selected and designed for Site 2.
Section 5	Site Restoration - describes the restoration activities following remediation of Site 2.
Section 6	Emission Control Plan - discusses the controls to be implemented to prevent air emissions during remediation at Site 2.
Section 7	Remediation Documentation - provides a description of the documentation required during remediation.
Section 8	Permits - includes a discussion of pertinent permits.
Section 9	Demobilization - describes demobilization procedures following remediation and site restoration.

TABLE 1.1
SOIL SCREENING AGAINST CRITERIA[1]

Chemical	Maximum Detected Background µg/kg[2]	Maximum Detected Concentration µg/kg[2]	Soil Criterion (µg/kg)[3]			Maximum Exceeds Appropriate Criterion[4]	Maximum Exceeds Maximum Background
			MSC Direct Contact Residential	MSC Soil to GW Residential	USEPA Region 3 RBC		
Benzene		1,200 [a]	38,000	130	-	Y	
n-Butylbenzene		18,000 [b]	1.0E+07 [c]	70,000 [c]	-	N	
sec-Butylbenzene		5,400 [b]	1.0E+07 [c]	70,000 [c]	-	N	
Chlorobenzene		2,200 [a]	4.4E+06	5,500	-	N	
2-Chlorotoluene		40,000 [b]	4.4E+06 [d]	-	-	N	
4-Chlorotoluene		1,600 [b]	4.4E+06 [d]	-	-	N	
1,2-Dichlorobenzene		5,000 [a]	3.8E+06	60,000	-	N	
1,3-Dichlorobenzene		5,500 [a]	5.9E+06	61,000	-	N	
1,4-Dichlorobenzene		33,000 [a]	750,000	10,000	-	Y	
1,1-Dichloroethane		280 [b]	2.0E+05	2,700	-	N	
1,1-Dichloroethene		1.2 [a]	6,400	700	-	N	
cis-1,2-Dichloroethene		94,000 [b]	670,000	7,000	-	Y	
trans-1,2-Dichloroethene		2.2 [a]	1.3E+06	10,000	-	N	
Ethylbenzene		29,000 [b]	1.0E+07	70,000	-	N	
Isopropylbenzene		14,000 [b]	1.0E+07	70,000	-	N	
p-Isopropyltoluene		7,500 [b]	1.0E+07 [e]	1.0E+06	-	N	
Methyl-t-butyl ether		18,000 [a]	1.0E+07	2,000	-	Y	
Methylene chloride		750 [a]	670,000	500	-	Y	
n-Propylbenzene		16,000 [b]	1.0E+07 [c]	70,000	-	N	
Styrene		3,750 [a]	1.0E+07	24,000	-	N	
1,1,2,2-Tetrachloroethane		3,100 [b]	5,500	74	-	Y	
Tetrachloroethene		1,600 [a]	340,000	500	-	Y	
Toluene		50,000 [b]	7.6E+06	100,000	-	N	
1,1,1-Trichloroethane		0.21 [a]	1.0E+07	20,000	-	N	
Trichoroethene		600,000 [b]	190,000	500	-	Y	
1,3,5 - Trimethylbenzene		48,000 [b]	1.0E+07 [e]	1.0E+06	-	N	
1,2,4 - Trimethylbenzene		140,000 [b]	1.0E+07 [e]	1.0E+06	-	N	
Xylenes		204,000 [b]	1.0E+07	1.0E+06	-	N	
Acenaphthene		3,800 [a]	1.3E+07	2.7E+06	-	N	
Acenaphthylene		100 [a]	1.3E+07	2.5E+06	-	N	
Anthracene		1,900 [a]	6.6E+07	230,000	-	N	
Benzo(a)anthracene		3,400 [a]	25,000	80,000	-	N	
Benzo(a)pyrene		2,300 [a]	2,500	46,000	-	N	
Benzo(b)fluoranthene		5,400 [a]	25,000	600,000	-	N	
Benzo(g,h,i)perylene		1,100 [a]	1.3E+07	180,000	-	N	
Benzo(k)fluoranthene		5,400 [a]	250,000	600,000	-	N	
Bis(2-ethylhexyl)phthalate		45,000 [a]	1.3E+06	130,000	-	N	
Chrysene		3,500 [a]	2.5E+06	220,000	-	N	
Di-n-butylphthalate		1,155 [a]	1.0E+07	1.5E+06	-	N	
Di-n-octylphthalate		21 [a]	4.4E+06	1.0E+07	-	N	
Dibenzofuran		2,500 [a]	100,000 [f]	-	-	N	
Diethylphthalate		1,800 [a]	1.0E+07	500,000	-	N	
Dimethylphthalate		9,100 [a]	100,000 [f]	-	-	N	
Fluoranthene		9,100 [a]	8.8E+06	3.3E+06	-	N	
Fluorene		7,200 [a]	8.8E+06	380,000	-	N	
Indeno(1,2,3-cd)pyrene		1,100 [a]	25,000	7.0E+06	-	N	
Naphthalene		24,000 [b]	8.8E+06	5,000	-	Y	
2-Methylnaphthalene		23,000 [a]	8.8E+06	6.0E+06	-	N	
Phenanthrene		11,000 [a]	6.6E+07	1.1E+07	-	N	
Pyrene		8,100 [a]	6.6E+06	220,000	-	N	
Antimony		12,800 [a]	88,000	27,000	-	N	N
Arsenic	98,200	217,000 [a]	12,000	150,000	-	Y	Y

TABLE 1.1
SOIL SCREENING AGAINST CRITERIA[1]

Chemical	Maximum Detected Background µg/kg[2]	Maximum Detected Concentration µg/kg[2]	Soil Criterion (µg/kg)[3] MSC Direct Contact Residential	MSC Soil to GW Residential	USEPA Region 3 RBC	Maximum Exceeds Appropriate Criterion[4]	Maximum Exceeds Maximum Background
Beryllium	1,900	4,600 [a]	4,200	320,000	-	Y	Y
Cadmium		19,700 [a]	110,000	38,000	-	N	N
Chromium	35,000	295,000 [a]	1.1E+06	340,000	-	N	Y
Copper	12,400	96,200 [a]	1.9E+08	3.6E+07	-	N	Y
Lead	9,100	1.4E+06 [a]	500,000	450,000	-	Y	Y
Mercury		210 [a]	19,000	10,000	-	N	N
Nickel	23,100	71,100 [a]	4.4E+06	650,000	-	N	Y
Selenium		720 [a]	1.1E+06	26,000	-	N	N
Silver		1,000 [a]	1.1E+06	84,000	-	N	N
Thallium		1,000 [a]	18,000	14,000	-	N	N
Zinc	73,800	336,000 [a]	6.6E+07	1.2E+07	-	N	Y

(1) Covers all samples identified as surface soil, subsurface soil, and sediment.
(2) References: a = Earth Tech (1996); b = Parsons ES (1997a).
(3) MSC = medium-specific concentration from PA Act 2 (8/97 Final Regulation; PADEP, 1997). RBC = risk-based concentration for soil (USEPA, 1997). The MSC is the preferred criterion; thus, an RBC is listed only if no MSC is available. Surrogate values: c = ethylbenzene; d = chlorobenzene; e = xylenes; f = Act 2 Threshold Value (Appendix A, Table 6) A dash ("-") indicates that no criterion or surrogate value is available, or that an RBC is not listed since an appropriate MSC is already listed.
(4) Y = yes, the maximum detected concentration exceeds the MSC, or if no MSC is available, the maximum detected exceeds the RBC; N = no, the maximum detected concentration does not exceed the MSC, or if no MSC is available, the maximum detected concentration does not exceed the RBC. Chemicals exceeding the appropriate criteria are shaded and in bold typeface in the lefthand column.

TABLE 1.2
REMOVAL ACTION SCHEDULE

Task Description	Start	Completion
EE/CA	April 1997	December 1997
Action Memorandum	October 1997	December 1997
Remedial Design (35% through 100%)	October 1997	December 1997
Remediation Bid/Procurement	February 1998	April 1998
Mobilization to Site	April 1998	May 1998
Site Preparation	May 1998	May 1998
Remediation	June 1998	June 1998
Site Restoration	June 1998	July 1998
Closure Report	August 1998	October 1998
PADEP Final Approval	--	November 1998

SECTION 2

SITE BACKGROUND

The Pennsylvania Air National Guard (PaANG) Station property is owned by the Pennsylvania State University (PSU) located in College Township, Pennsylvania (Drawing No. G-1). The Station is located on 2.9 acres of level ground. The elevation of the station is approximately 1172 feet above mean sea level (AMSL). The land surrounding the Station is used for the Pennsylvania State University (PSU) athletic fields and ongoing agricultural experimentation.

Site 2 is the area adjacent to the northwest end of the Vehicle Maintenance Shop and consists of the Sump/Dry Well and vehicle wash pad. Site 2 plan and location map is shown on Drawing No. C-1. The Sump/Dry Well is connected by approximately 15 ft of underground metal drainpipe to the wash pad drain. The surface area is covered by asphalt and concrete and the only visible evidence of the Sump/Dry Well on the surface is the wash pad drain. The wash pad is sloped to direct the run-off to the wash pad drain. A water hose is located on the adjacent wall of the shop for washing vehicles, equipment, etc. The exact dates of installation for the Sump/Dry Well, wash rack, and drainpipe are not known, but the Preliminary Assessment (PA) (Science and Technology, 1991) estimated that it was probably sometime between 1955 and 1957. The Sump may have been used for collection, holding, and dissipating liquids from the wash rack, including various amounts of ethylene glycol, TCE, and naphtha. The wash rack was taken out of service in July 1993. At about this time, the inlet to the Sump/Dry Well at the wash rack was sealed.

SECTION 3

PROJECT ORGANIZATION

PaANG and PADEP are actively participating in a cooperative effort in the removal action proposed for Site 2. PaANG is leasing the site from the Pennsylvania State University (Owner) and has assumed responsibility for the removal action. PADEP personnel are anticipated to be on site for purposes of general program oversight. Participation of and cooperation with the state and local authorities will be actively pursued for the duration of the project and for all remediation activities at the site. The project team believes that the participation of these entities is essential to the environmental restoration process and to ensure the protection of the public interest and health. The removal action as conducted by the remediation contractor (Contractor) will comply with all pertinent federal, state and local regulations.

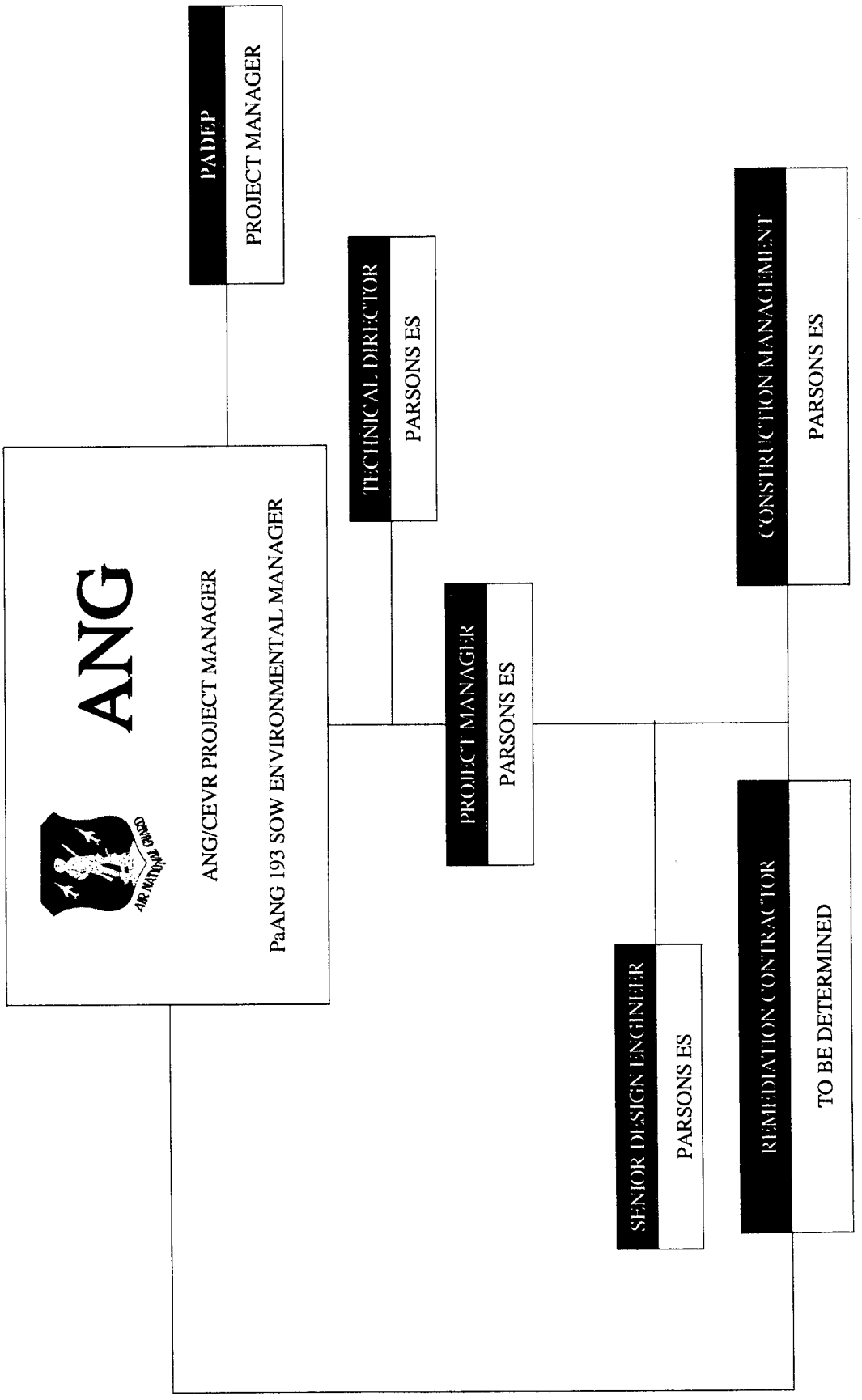
Parsons Engineering Science, Inc. (Parsons ES) is responsible for the design of the removal action, maintenance of non-construction personnel and safety, construction management to verify that the removal action is implemented in accordance with this design, and monitoring the achievement of site cleanup goals and their documentation.

A remediation contractor will be contracted by ANG and the Contracting Officer upon PADEP approval of this removal action design plan. The Contractor will be responsible for site construction activities to implement this removal program.

An organizational chart is shown in Figure 3.1.

FIGURE 3.1

PaANG
Site 2 State College Removal Action Design
Project Organizational Chart



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SECTION 4

REMOVAL ACTION PROGRAM

4.1 GENERAL REQUIREMENTS

The PaANG recommended and PADEP approved removal alternative to mitigate contaminated sediment and soil at Site 2 is Alternative 4 - Removal and Treatment or Disposal, as presented in the EE/CA includes the following project activities:

- Mobilization and demobilization of the remediation contractor (personnel, materials and equipment) to and from Site 2;
- Site preparation will include erosion and sedimentation control measures that will be carefully and vigorously implemented. Site preparation will also include the removal of a section of the security fence prior to the construction activities to allow for the freedom of movement of equipment at Site 2;
- Site 2 will be cleared of equipment and vehicles and the asphalt and concrete surface layers will be saw cut and removed via conventional excavation equipment;
- Exposed sediment and soil will be excavated, temporarily stockpiled and dewatered, if necessary, and transported via 25- to 30-ton haul trucks to an offsite permitted facility for treatment or disposal;
- The type of offsite treatment and/or disposal option selected will be based on the results of the required sampling and analytical testing prior to shipment of the material. The offsite treatment and disposal options under consideration are recycle/reuse, solid waste landfill, or hazardous waste landfill (if the analytical testing deems the material to be characteristically hazardous);
- Following the excavation of soil and sediment and the achievement of the cleanup criteria, the excavation will be backfilled with clean fill; and
- Restoration of asphalt and concrete will include the replacement in kind (estimate of six inches of asphalt or concrete and 12 inches of gravel subbase).

Alternative 4 will be protective of public health and the environment. Alternative 4 will be effective over the short and long term by removing the source and the corresponding risk based on the potential for long-term or future exposure to receptors through excavation. The sediment and soil excavation through site restoration phases of the removal action will be conducted over a period of approximately two months, between May and July, to minimize the potential for erosion and the time that the site is exposed (i.e., under construction). Site restoration will be completed following the completion of the excavation and backfilling. Contractor will be expected to work eight to 10 hour days

for the duration of the project. Access to the site will be restricted to authorized personnel.

Trucks are able to access and egress the site via existing roads. An estimated 340 cubic yards of soil/sediment will be transported to the designated offsite treatment or disposal facilities. Details of the removal action program and the project team responsibilities for the various phases of the work are described herein.

4.2 MOBILIZATION

The remediation contractor will mobilize to Site 2 as required to accommodate the general requirements and specific operations to be undertaken. Materials, personnel, and equipment will be brought to the site by the Contractor on an "as-needed" basis until the support (staging area) and contaminant reduction zones are secured. Materials and equipment to be mobilized to the site may include, but is not limited to: wastewater storage tanks; decontamination pad equipment and materials; personnel protective equipment; portable toilet facilities; construction and storage trailers; soil/sediment dewatering pad materials; various pieces of equipment, including excavators, dozers, and front-end loaders; and miscellaneous equipment such as pumps and hand tools; and will be stored in the staging area. All equipment will be decontaminated by the Contractor prior to mobilization to Site 2. Equipment and materials will subsequently be mobilized and stored at the staging area.

4.3 SITE PREPARATION

Site preparation activities will be conducted by the Contractor and will include construction of a support zone (staging area) on the property located near Site 2. This area will be cleared of any vehicles and equipment to allow access for trucks, vehicles and construction trailers. Other site preparation activities to be conducted by the Contractor will include establishment of a contamination reduction zone, site drainage modifications, and installation of erosion and sedimentation controls. A soil/sediment dewatering area and filtrate storage area will be constructed by the Contractor. Due to the sensitive nature of the work, site preparation and sequencing will be important in preventing release of contaminated material. Specific site preparation work elements to be completed by the Contractor are described in the following subsections.

4.3.1 Notification

Prior to any onsite activities, the Underground Facilities Protection Organization (UFPO, 1-800-962-7962) will be notified by the Contractor and all utilities will be marked in the field.

4.3.2 Excavation Limits Survey and Stakeout

The limits of the excavation shall be surveyed by a licensed Pennsylvania surveyor and staked out in the field under the direction of the Contractor, based on the approval of the Contracting Officer or authorized representative (Construction Manager/Engineer).

4.3.3 Site Security

The entire site is enclosed by a chain link fence. The segment of the existing security fence located adjacent to Site 2 will be removed by the Contractor to allow for maneuverability around the site during the removal action. This segment of the fence will be replaced by the Contractor following the completion of the removal action (see Drawing No. C-2). Security of the site will be maintained at all times by the Contractor for the duration of the project. During periods when the permanent fence is removed for access, temporary fencing will be installed by the Contractor.

4.3.4 Erosion and Sedimentation Control

Before general site excavation activities occur, site erosion and sedimentation controls will be instituted by the Contractor to reduce the potential for offsite migration of disturbed soils. This system will include a perimeter silt fence and haybales, installed beyond the limits of the excavation (see Drawing No. C-2). Additional silt fencing will be installed by the Contractor during construction to address observed conditions.

4.3.5 Decontamination

All vehicles, trucks, and construction equipment will be decontaminated by the Contractor using pressure wash cleaning at a decontamination pad (contamination reduction zone) prior to leaving the site. Decontamination operations will be observed by the onsite Construction Manager representing PaANG.

Site zones will be constructed and posted by the Contractor prior to excavation. These zones include the site support, contamination reduction, and exclusion zones. The Contractor will post a zone label at the entrance to each zone, and any special conditions (e.g., Personal Protective Equipment (PPE), training) will be identified.

The Contractor will be responsible for collecting all decontamination wastewaters. To do so, the Contractor must construct a decontamination (decon) pad in accordance with the detail (Drawing No. C-2) and sized as necessary for the Contractor's operation. This pad will be covered with plastic sheeting while not in use. A decon pad will be constructed to a depth of approximately 12 inches; a cushion geotextile will be placed on grade, followed by a 40 mil geomembrane, a drainage composite, and a 12-inch layer of clean gravel or crushed stone. The bed of the decontamination pad will slope to one corner, where a sump (12 inch slotted PVC pipe) will be placed to collect decon water. This pad must be located on site within the contamination reduction zone constructed adjacent to the exclusion zone, to allow access by all vehicles leaving the site which need to be decontaminated.

Decontaminated liquids will be pumped by the Contractor to temporary storage tanks, contained, and treated as wastewater in accordance with the requirements of Section 4.5 of this design.

4.4 EXCAVATION OF SOILS AND SEDIMENTS

The soil and sediment excavation area limits are shown on Drawing No. C-2. The excavation limits will be verified, surveyed and staked out in the field prior to construction by the Contractor. The material within the limits will be excavated to the depths specified in a manner which provides stable cut slopes through benching the excavation or other means that satisfy OSHA requirements. Prior to soil and sediment excavation and the removal of the sump/dry well and corresponding drain piping, the asphalt and concrete covering the excavation area will be saw cut, demolished, and removed by the Contractor. Soil excavation depths will be up to ten feet below ground surface. The Contractor and Construction Manager/Engineer, in a cooperative effort, shall establish manageable and appropriate excavation stages which will permit continuous work by the Contractor while accommodating specific sampling requirements.

Any additional or out of scope work will be approved by the ANG and directed by the Contracting Officer. The Construction Manager/Engineer (Contracting Officer's Authorized Representative), through coordination with the ANG and Contracting Officer, will determine additional excavation limits through field tests, and delineate areas that need additional excavation based on the ANG's and Contracting Officer's approval. Additional excavations will be performed in one-foot depth increments to remove subsurface soils to the agreed upon cleanup criteria. The Contractor will allow the Construction Manager/Engineer 48 hours to determine additional excavation requirements for the area. No seepage is expected into the excavation; however, precautions must be taken by the Contractor to keep the excavation dry during precipitation events. If encountered, standing water will be addressed by the Contractor through dewatering of the excavation via pumps and temporary storage tanks.

Field operations will include segregating contaminated soil/sediment if the soil/sediment concentrations exceed hazardous waste criteria based on TCLP results of stockpile composite samples. Contaminated soil/sediment stockpiles will be placed on liners and covered with tarps.

It is estimated that the total amount of soil to be excavated will be approximately 340 cubic yards (in-place volume). Contractor will provide a lump sum bid on this estimated volume. Additional volume excavated by the Contractor will be conducted on a unit price basis. The excavation will be backfilled by the Contractor upon completion of the excavation and verification of clean (i.e., excavated to the cleanup criteria) side walls and bottom of the excavation. Verification of clean side walls and bottom of the excavation will be accomplished through confirmation sampling conducted by the Contractor (supervised by the Construction Manager/Engineer). Refer to the Sampling Analysis Plan (SAP) and Quality Assurance/Quality Control (QA/QC) Plan for details regarding verification sampling and analysis methods and procedures (Appendices B and C).

4.5 MATERIAL DEWATERING

Excavated soils and sediment will be dewatered by the Contractor to an acceptable percent solids or other criteria as specified by the final waste treatment or disposal facility. The Contractor will dewater material on a temporary dewatering pad constructed by the Contractor. The dewatering pad will consist of geotextile and a 40 mil LDPE geomembrane, a drainage composite, and a six inch layer of clean gravel or clean crush stone. A woven geotextile will be placed on the stone by the contractor to separate it from the soil and minimize clogging of the pad drainage system. The pad will be graded by the Contractor to a low point with a sump (12 inch slotted PVC pipe) to collect filtrate. Filtrate generated from dewatering will be transferred by the Contractor to a temporary storage tank supplied by the Contractor, combined with the decon waters, and shipped offsite by the Contractor for treatment. The small volume of water anticipated would not justify an onsite mobile treatment unit. Gravel or crush stone will be transported offsite with the soil/sediment for disposal.

4.6 RESIDUAL WASTE MANAGEMENT

Waste materials other than site soil and sediment, gravel or crush stone, encountered or generated during the remediation will be disposed of at a construction and demolition debris landfill or sanitary landfill. Residual wastes may include, but are not limited to, personal protective equipment (PPE), plastic, used geomembrane, garbage, and silt fencing. Representative samples will be collected by the Contractor for analysis to determine if the material is hazardous through TCLP testing.

4.7 STOCKPILE MANAGEMENT

To verify conformance with treatment and/or disposal criteria, a sampling and analysis program for stockpiled soil/sediment will be undertaken by the Contractor prior to the onsite Construction Manager/Engineer approving the loadout of the waste. The Contractor will incorporate procedures for management of stockpiled soil/sediment, as required, to accommodate the sampling and analysis program. Details of the soil/sediment stockpile sampling and analysis methods and procedures are presented in the SAP and QA/QC Plan (Appendices B and C).

4.8 LOADOUT AND WASTE TRANSPORTATION

The transportation of waste to the permitted treatment or disposal facility, selected by the Contractor, will be accomplished by the Contractor in accordance with the following requirements:

- Vehicles used for the transport of waste material will be liquid-tight (e.g. gasketed tailgates, tarps, etc., or equals);
- The trucking company and vehicles used for the transportation of waste will be fully permitted to do so in accordance with all applicable federal and state (PADEP and PennDOT) regulations;

- The Contractor will conform to the bill of lading and/or manifest system. The Contractor will be responsible for verifying that all manifests are signed by the appropriate representatives, and that copies of all manifests are provided to the onsite Construction Manager/Engineer;
- Vehicles will be weighed on a portable scale provided by the contractor. Contractor will be required to provide documentation to verify the scale is properly calibrated. Vehicles will be weighed into (tare) and out of (loaded) the site by the Contractor. Due to the available area, the scale may be located within the exclusion zone limits. The Contractor shall convey weigh receipts from the scale to the Construction Manager/Engineer;
- All portions of site vehicles which contact contaminated material must be decontaminated by the Contractor in the contamination reduction zone prior to leaving the site; and
- The Contractor will provide traffic control procedures as needed to provide safe access and egress from the site. The transportation route between the site and the selected treatment or disposal facility will be provided by the Contractor;

4.9 BACKFILL

Upon receipt of favorable soil confirmation analytical results for a given quarry borrow pit, suitable clean fill will be imported to the site for use as backfill. Backfill shall at no time be mixed or contact any contaminated media. A Toxicity Characteristic Leaching Procedure (TCLP) analysis of each source of backfill material must be completed, submitted by the Contractor along with a sieve analysis to the Construction Manager/Engineer for approval prior to importation to the site. Backfill containing stumps, roots, or organic material will be rejected by the onsite Construction Manager/Engineer. Backfill will be placed in six-inch lifts and compacted to 95% Standard Proctor by the Contractor. Contractor will test using field instruments (e.g. Nuclear Density Gauge or equal) to confirm that 95% Standard Proctor has been achieved for each six-inch lift of backfill material.

SECTION 5

SITE RESTORATION

Following removal of the contaminated soil and sediment and backfilling of the project area, the area will be stabilized and restored to preconstruction conditions. The proposed restoration work will be implemented in a manner that does not require extensive fill material past the line of the excavation. Proposed restoration work will conform to the original grades. Any disturbed grass areas will receive four inches of topsoil and hydroseed.

Concrete and asphalt pavement areas disturbed during the remediation operations will be replaced in kind (i.e., replaced with the quality and quantity of materials used to construct the original structures).

The estimated cross-sections of the existing asphalt and concrete pavement structures in the area of Site 2 consist of approximately four to six inches of asphalt or concrete and 12 inches of gravel subbase. Refer to Drawing No. C-2 for details on asphalt and concrete restoration.

SECTION 6

EMISSION CONTROL PLAN

Due to the content of Site 2 soils, there exists a potential for generating fugitive dust during remediation operations. Therefore, monitoring of fugitive dust will be conducted by the Contractor continuously at the downwind property boundary. The monitoring will be accomplished with a real-time aerosol monitoring instrument (e.g., DataRAM, MiniRAM, or equal) which operates based on the principle of light scattering. The real-time aerosol monitoring instrument shall respond to particle concentrations in the range of 0.0001 to 400 milligrams per cubic meter. Recorded measurements will be logged by the onboard large-capacity data logging capability, which saves concentration data for future analysis. Stored information will be downloaded at the end of each working day. A high-level alarm with built-in audible signal will sound when the action level (concentration) is exceeded. An action level of 0.15 milligram per cubic meter averaged over a 15-minute period will be used to determine whether modifications to site activities are required. If the action level is exceeded, real-time monitoring of the upwind background level will be measured immediately using the same portable monitor. If the working site particulate concentration measurement is greater than 0.10 milligrams per cubic meter above the upwind background level, dust suppression techniques will be implemented by the Contractor to reduce the generation of fugitive dust and corrective action taken to protect site personnel and reduce the potential for contaminant migration (Appendix D - Contingency Plan). The real-time aerosol monitoring instrument will be calibrated daily to zero with a filtered air sample. While excavating soil/sediment with high concentrations of contaminants, a total of three air samples (National Institute of Occupational Safety and Health (NIOSH) Method 5503) will be taken to confirm the dust monitoring results.

SECTION 7

REMEDIATION DOCUMENTATION

The Contractor shall provide the following documentation of the removal action. The documentation will be reviewed by the Construction Manager/Engineer for compliance with removal action objectives and requirements stipulated in the Work Plan and on the engineering drawings, and associated HASP, SAP, QA/QC Plan, and Contingency Plan. The onsite Construction Manager/Engineer will keep a daily field report as a reference document for verifying the contractor's activities.

7.1 DAILY FIELD REPORT

A daily field report (DFR) will be used to document daily onsite activities. Each day, a report will document significant construction work accomplished, manpower and equipment used, any special incidents, special instructions, damages to property, claims, weather conditions (precipitation, skies, air temperature, wind, ground moisture), site conditions, any visitors to the site, work not in compliance, and documentation of photographs taken. A binder containing the DFRs will be kept in the field office.

7.2 SAMPLE LOG

A laboratory notebook will remain in the field office to record each sample collected. This will include type of sample (water, air, or soil), location, time when sample was taken, whether the sample is analyzed in the field (and result), or sent to a laboratory. Waybill numbers will be logged at the end of each day.

7.3 CHAIN-OF-CUSTODY RECORDS

A chain-of-custody form will document custody of all samples from the field to the laboratory.

7.4 WAYBILLS

A waybill receipt will be obtained at the time of accepted sample shipment by Federal Express or courier and will be attached to the sample log.

7.5 ACCIDENT REPORTING

An Accident and Incident Report and OSHA 200 forms will be used to document any accident occurring on site during the removal action. These forms are attached to the Health and Safety Plan (Appendix A) and will be located in the field office.

7.6 AIR MONITORING LOGS

Results of the real-time aerosol monitoring at the downwind site boundary will be documented in an air monitoring log. This will include the time, date, location and instrument reading for each monitoring event.

7.7 MANIFEST LOG

Manifests and weight scale receipts will be logged in the manifest log.

SECTION 8

PERMITS

The Contractor will be responsible for obtaining all appropriate permits and providing a copy to the Construction Manager/Engineer. The trucking company and vehicles used by the Contractor for the transportation of waste will do so in accordance with all applicable federal and state (PADEP and PennDOT) regulations, including the waste hauler permit requirements.

SECTION 9

DEMOBILIZATION

Once site restoration (Section 5) is complete, all equipment, materials, construction debris, and personnel will be demobilized from the site by the Contractor at the conclusion of the project. All equipment must be decontaminated by the Contractor prior to leaving the site, and construction debris shall be disposed of as detailed in Section 4.6.

APPENDIX A

HEALTH AND SAFETY PLAN

FINAL

APPENDIX A
ANG/CEVR
INSTALLATION RESTORATION PROGRAM
SITE SPECIFIC HEALTH & SAFETY PLAN

Prepared For:

STATE COLLEGE AIR NATIONAL GUARD STATION
ANG/CEVR
3500 Fetchet Avenue
Andrews AFB, Maryland 20762-5157

Prepared By:

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DECEMBER 1997

TABLE OF CONTENTS

TABLE OF CONTENTS
(Continued)

TABLE OF CONTENTS
(Continued)

TABLE OF CONTENTS
(Continued)

TABLE OF CONTENTS
(Continued)

TABLE OF CONTENTS
(Continued)

FIGURES

TABLE OF CONTENTS
(Continued)

PAGE

TABLES

LIST OF ACRONYMS

ACGIH	American Conference of Governmental Industrial Hygienists
AGE	Aerospace Ground Equipment
AMSL	Above Mean Seal Level
ANG	Air National Guard
ANGRC	Air National Guard Readiness Center
ATCF	114th Air Traffic Control Flight
CFR	Code of Federal Regulations
CRC	Contamination Reduction Corridor
CRZ	Contamination Reduction Zone
EPA	Environmental Protection Agency
FID	Flame Ionization Detector
HSP	Health and Safety Plan
IDLH	Immediately Dangerous to Life or Health
IRP	Installation Restoration Plan
KV	Kilovolts
LEL	Lower Explosive Limit
MSDS	Material Safety Data Sheets
NFPA	National Fire Protection Association
NIOSH	National Institute for Occupational Safety and Health
OSHA	Occupational Safety and Health Administration
PAANG	Pennsylvania Air National Guard
PAH	Polynuclear Aromatic Hydrocarbon
PCE	Tetrachloroethene
PEL	Permissible Exposure Limit
PID	Photoionization Detector
PPE	Personal Protective Equipment
PSU	Pennsylvania State University
QA/QC	Quality Assurance/Quality Control
SCBA	Self-Contained Breathing Apparatus
SIC	Standard Industrial Classification

LIST OF ACRONYMS
(Continued)

SVOC	Semivolatile Organic Compound
TCE	Trichloroethene
TCS	Tactical Control Squadron
TLV	Threshold Limit Value
TPH	Total Petroleum Hydrocarbons
UV	Ultraviolet
VOC	Volatile Organic Compound
WBGT	Wet Bulb Globe Temperature

SECTION 1

INTRODUCTION

1.1 PURPOSE AND SCOPE

This document is a site-specific Health and Safety Plan (HSP) for the Pennsylvania Air National Guard (PaANG)'s State College facility located in State College, Pennsylvania (Figure 1-1). Specifically work will be conducted at Site 2 of this facility (Figure 1-2). This plan describes rules and procedures that contractor personnel will follow to perform their duties safely, competently, and in compliance with all applicable federal, state, and local statutes, and regulations. **Nothing in this plan operates to relieve the contractor or its subcontractors of its responsibilities for the safety and health of its workers and compliance with this plan. Contractors are required to provide their own HSP which must meet the requirements outlined in this HSP at a minimum.**

This plan provides the health and safety guidance for protecting workers during operations governed by the Occupational Safety and Health Administration (OSHA) contained in the 29 Code of Federal Regulations (CFR) Section 1910.120. Managerial, professional, and technical personnel should use this plan as a guide to proper health and safety procedures while working at this Air National Guard site.

1.2 HEALTH AND SAFETY PLAN OVERVIEW

This Health and Safety Plan has the following objectives:

- Promote a safe and healthful work environment;
- Minimize the risk of human, environmental, and economic losses resulting from accidents;
- Comply with safety and health laws, regulations, and policies;
- Perform health and safety tasks efficiently; and
- Satisfy PaANG program needs.

Successful implementation of this plan requires cooperation between contractor personnel and PaANG staff. All contractor personnel are expected to accept the responsibility to use all materials and equipment properly, to follow work procedures and rules, and to aid field supervisors in identifying and correcting unsafe conditions.

All Parsons Engineering Science, Inc. (Parsons ES) personnel are required to read and abide by this project specific HSP and sign a plan acceptance form (Figure 1.3). This form will be kept in the project files.

1.3 HAZARD IDENTIFICATION

Unsafe and unhealthy conditions at this PaANG site will be identified through one or more of the following:

- Investigating and observing work areas and work practices and looking for present or potential health and safety problems;
- Investigating work-related injuries and illness (or near-misses) to identify problems that need correction;
- Evaluating worker suggestions or complaints.

This site-specific HSP includes the following sections:

- A description of the site and tasks to be performed;
- A description of the site or work area history;
- A site-specific or task-specific hazard assessment that includes identification and characterization of potential physical and chemical hazards;
- Monitoring requirements and establishment of exposure limits for specific chemical parameters;
- Personal protective equipment for each task;
- Work site safety requirements;
- Site control guidelines;
- Exposure precautions;
- Site entry guidelines;
- Decontamination guidelines;
- Waste handling and disposal guidelines;
- Contingency plans;
- Specific task guidelines (such as confined space entry);
- An approval statement;
- HSP acceptance forms; and
- Attachments.

This site-specific HSP is subject to review and approval by the PaANG site manager.

1.4 PROJECT WORK SCOPE OVERVIEW

Parsons ES will provide contractor oversight during the excavation of the Sump/Dry Well and drain along with the surrounding soil at Site 2. Parsons ES will collect soil samples at six locations at the site to confirm no contamination beyond the excavation limits. (Figure 1.2). Five soil samples shall be collected around the sump and dry well; (one sample around each edge of the previous drywell location and one sample collected from the bottom center of the previous dry well location). The sixth sample location will be in the vicinity of the drain and connection pipe. In addition, quality assurance/quality control (QA/QC) samples will be collected and will include the following: one trip blank, one MS/MSD, one equipment rinseate, one field blank, and one field duplicate. Soil samples shall be submitted for laboratory analysis at EPA QA Level III. Laboratory analysis shall include standard turn around.

1.5 SITE DESCRIPTION

Site 2 is located on the State College Air National Guard (PaANG) Station in College Township, Centre County, Pennsylvania (Figure 1.1). The Station is located adjacent to the main campus of the Pennsylvania State University (PSU) on a 2.9-acre property owned by the PSU.

One area, designated Site 2, will be remediated at the site. Site 2 is adjacent to the northwest end of the Vehicle Maintenance Shop and includes the Sump/Dry Well and a vehicle wash pad. Site 2 is shown on Figure 1.2. The Sump/Dry Well is connected by approximately 15 ft of underground metal drainpipe to the wash pad drain. The surface area is covered by asphalt and concrete and there is no visible evidence of the structure on the surface. The wash pad is sloped to direct the run-off to the drainpipe. A water hose is located on the adjacent wall of the shop for washing vehicles, equipment, etc.

Groundwater is estimated to occur at a depth of approximately 190 ft below ground surface in the vicinity of the Station as interpreted by Science and Technology during the preliminary assessment in 1991. Groundwater was not encountered in any of the soil borings advanced during the site investigation. Groundwater flow direction in the vicinity of the site is believed to be north to northwest as inferred by the surface topography (Earth Tech, 1996).

Site 2 soils have been impacted by past waste handling activities as evidenced by the presence of volatile and semivolatile organic and inorganic compounds. Detections of organic compounds (VOCs, SVOCs, PAHs, TPH) are concentrated in the subsurface soils near the Sump/Dry Well and in the sediment at the base of the Sump/Dry Well. The available data suggests that the Sump/Dry Well is the source of the surrounding soil contamination

The only data gap documented in the Site Investigation (Earth Tech, 1996) was that volatile organic compounds (VOCs) data was unavailable for the sediment within the Sump/Dry Well of Site 2; therefore, no conclusions regarding VOC contamination in the Sump/Dry Well could be made. To fill this data gap and to further characterize the area,

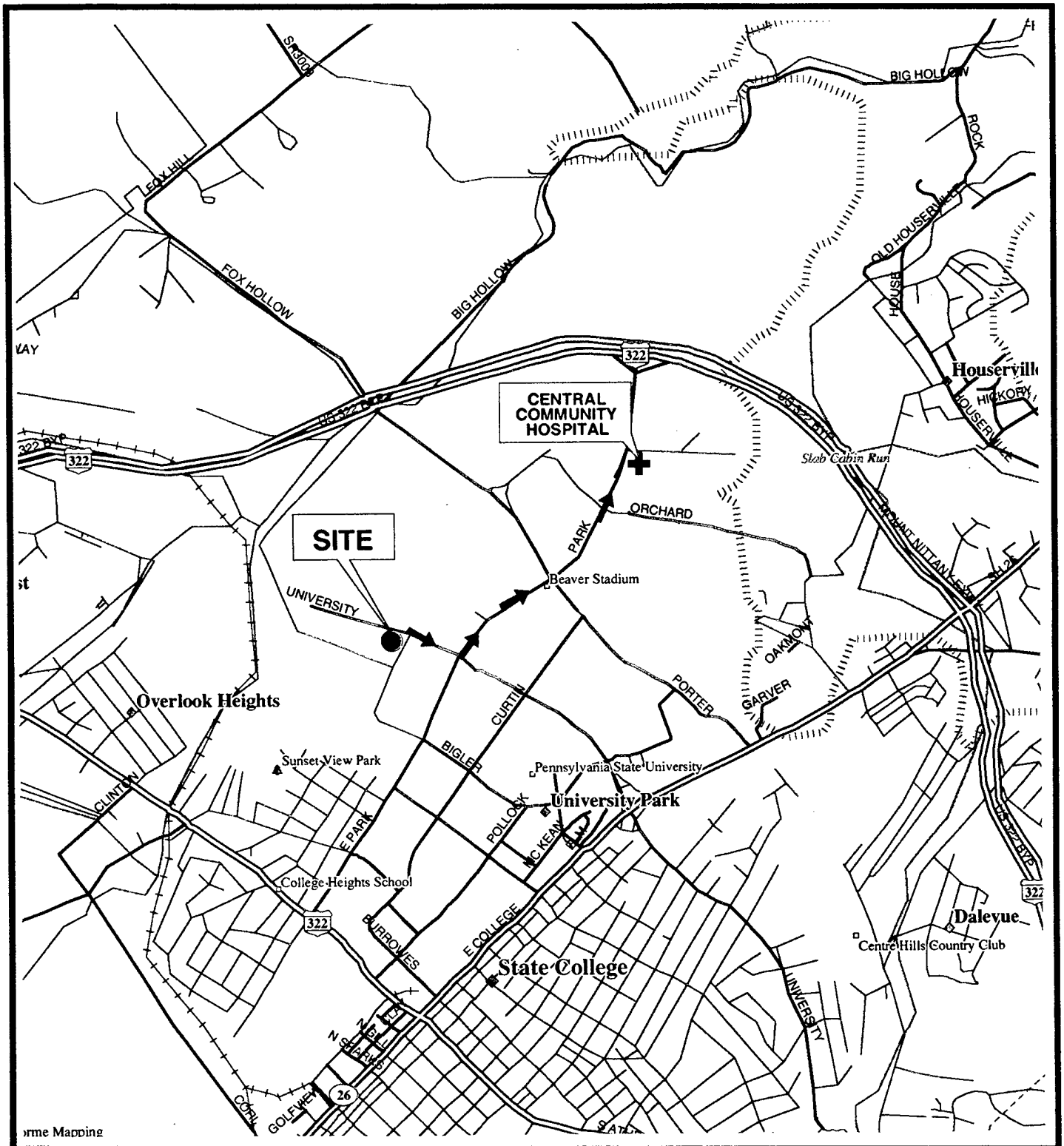
another investigation was completed in 1997 by Parsons ES. Results of this investigation indicate tetrachloroethene (PCE) north of the drywell, at a concentration of 12.6 µg/kg [2 to 4 feet below ground surface (bgs)]. PCE was also detected along the eastern side of the drywell at 21.6 µg/kg (0-2 feet bgs) and 6.35 µg/kg (2-4 feet bgs). Trichloroethene (TCE) was also detected at 5.8 µg/kg east of the drywell.

No present threat to the public health, welfare, and the environment exists at Site 2. However, it is the Air National Guard's position that leaving Site 2 in its current condition following the relocation of the PaANG at State College to its new location, could pose a potential threat because the National Guard would no longer have control over the land use at the site.

1.6 SITE HISTORY

In 1949, property for the Station was leased from PSU. The 112th Tactical Control Squadron (TCS) took possession of the Station upon completion of construction in 1949. The 114th Air Traffic Control Flight (ATCF) joined the Station in 1982. The mission of the 112th TCS is that of a forward control post. They provide radar control for aircraft support of ground forces and for intercept aircraft for protection of forces in an assigned area of responsibility in support of Tactical Air Operations. As a result of their mission, a significant amount of maintenance has always been performed at the Station. Reportedly, the repair and service of vehicles and aerospace ground equipment (AGE) items have taken place at the Station over the past 41 years. The mission of 114th ATCF is to provide air traffic control and landing system support for operation commands. The activities performed by the 112th TCS and the 114th ATCF include servicing of support vehicles and other machinery, including AGE.

The exact dates of installation for the Sump/Dry Well, and wash pad are not known, but the Preliminary Assessment estimated sometime between 1955 and 1957. The Sump may have been used for collection, holding, and dissipating liquids from the wash rack, including various amounts of ethylene glycol, TCE, and naptha. The wash rack was taken out of service in July 1993. At about this time the inlet to the Sump/Dry Well at the wash rack was sealed.



PENNSYLVANIA
QUADRANGLE LOCATION

LATITUDE: N40° 48' 42"
LONGITUDE: W77° 55' 59"

Scale 1:31,250 (at center)
2000 Feet
1000 Meters

FIGURE 1.1

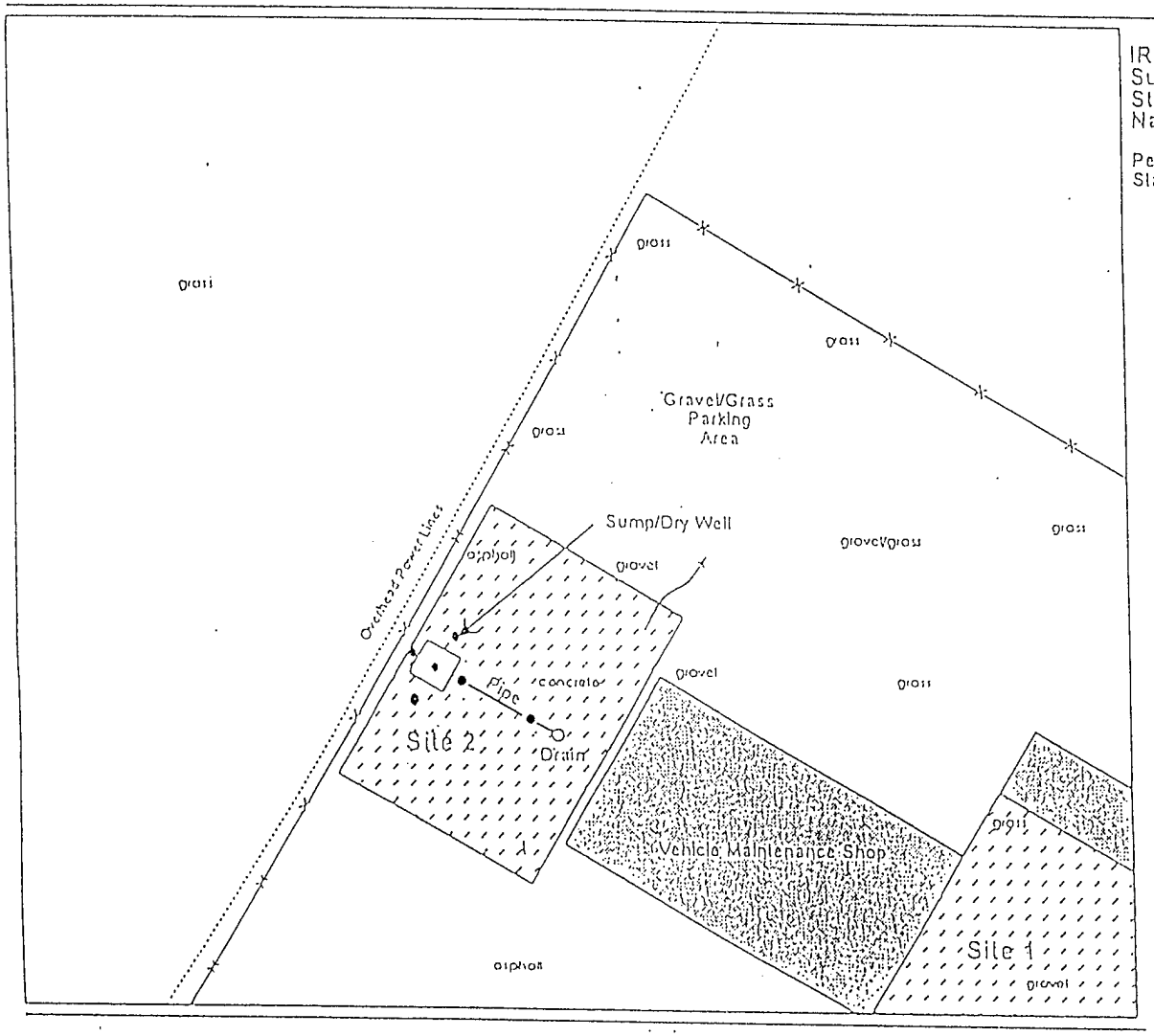
REMOVAL ACTION

ANG SITE 2

STATE COLLEGE, PENNSYLVANIA

ROUTE TO HOSPITAL MAP

PARSONS ENGINEERING SCIENCE, INC.
DESIGN • RESEARCH • PLANNING
290 ELWOOD DAVIS ROAD • SUITE 312 • LIVERPOOL, N.Y. 13088 • (315) 451-9560
OFFICES IN PRINCIPAL CITIES



IRP Site 2
Sump/Dry Well
State College Air
National Guard Station

Pennsylvania Air National Guard
State College, Pennsylvania

LEGEND:

- Direction of Surface Water Flow
- Building
- IRP Site
- Fence Line
- Proposed Sampling Location

DATE: 10/31/97 (SEH)
Xref. or View(s): NONE
730472.71000 (BOARD.DWG)
PLOT: XXXXXXXX MS/PS: X:X PCP: XXXX

NOT TO SCALE

FIGURE 1.2

REMOVAL ACTION
ANG SITE 2
STATE COLLEGE, PENNSYLVANIA

PROPOSED SAMPLING LOCATIONS

PARSONS ENGINEERING SCIENCE, INC.
DESIGN • RESEARCH • PLANNING
290 ELWOOD DAVIS ROAD • SUITE 312 • LIVERPOOL, N.Y. 13088 • 315/451-9560
OFFICES IN PRINCIPAL CITIES

FIGURE 1.3
PLAN ACCEPTANCE FORM
PROJECT HEALTH AND SAFETY PLAN

(For Parsons ES employees only)

I have read and agree to abide by the contents of the Work Plan and Health and Safety Plan for the following project:

_____ _____

(Project Title) (Project Number)

Furthermore, I have read and am familiar with the work plan or proposal which describes the field work to be conducted and the procedures to be utilized in the conduct of this work.

Name (print)	Signature	Date

Place in project Health and Safety File as soon as possible

SECTION 2

PROJECT ORGANIZATION AND RESPONSIBILITIES

2.1 ORGANIZATION

This section describes the responsibilities of all onsite personnel associated with the State College Air National Guard Station. Principal personnel associated with this IRP project are listed in Table 2.1.

2.2 RESPONSIBILITIES

The Program Manager designates a Health and Safety Program Manager to establish and implement an IRP Health and Safety plan. The Program Manager and ANGRC shall review and approve this site specific HSP. The Program Manager shall ensure that the Health and Safety Program Manager updates the plan annually, at a minimum. The Program Manager and the ANGRC must approve any revisions to this plan.

2.2.2 Project Manager

The Project Manager reports to the Program Manager, has authority to direct response operations, and assumes total control over project activities.

The Project Manager is responsible for the following:

- Obtaining permission for site access and coordinating activities with appropriate officials;
- Briefing the field teams on their specific assignments;
- Using the Program Health and Safety Manager and the Site Health and Safety Coordinator to ensure that safety and health requirements are met;
- Serving as the liaison with public officials;
- Ensuring that the project budget is adequate for the necessary health and safety procedures and equipment;
- Ensuring that the plan satisfies all federal, state, and local statutes, regulations, and ordinances concerning health and safety;
- Developing training materials;
- Setting up and conducting necessary training programs;
- Conducting audits to ensure compliance with the health and safety program;

- Updating the health and safety plan and program to meet new requirements and technologies;
- Maintaining program records;
- Reviewing and approving project health and safety plans for certain hazardous operations (e.g., Levels A and B activities, drum opening operations, etc); and
- Reviewing subcontractor HSPs.

2.2.3 Site Health and Safety Coordinator

The Site Health and Safety Coordinator reports to the Program Health and Safety Manager and advises the Field Manager and Program Health and Safety Manager of all unusual aspects of health and safety on site. The Site Health and Safety Coordinator is authorized to stop work if any operation threatens worker and/or public health or safety. The Site Health and Safety Coordinator is also responsible for the following:

- Inspecting protective clothing and equipment periodically;
- Ensuring that protective clothing and equipment are properly stored and maintained;
- Controlling entry and exit at the access points;
- Coordinating safety and health program activities with the Program Health and Safety Manager;
- Monitoring the work parties for signs of stress such as cold exposure and heat stress;
- Implementing the site safety plan;
- Conducting periodic inspections to determine if the site safety plan is being followed;
- Knowing emergency procedures and evacuation routes;
- Posting telephone numbers of emergency medical help, local hospitals, the poison control center, the fire department, and the police department;
- Notifying, when necessary, local public emergency officials;
- Coordinating emergency medical care;
- Setting up decontamination solutions appropriate for the type of chemical contamination onsite;
- Controlling the decontamination of all equipment, personnel, and samples;
- Assuring the proper disposal of contaminated clothing and materials;
- Ensuring that all required equipment is available;
- Advising medical personnel of potential exposures and consequences; and

- Notifying emergency response personnel by telephone or radio in the event of an emergency.

2.2.4 Field Team

All work parties must consist of a minimum of two people. All field team members must comply with the Program HSP as well as this site-specific HSP. Field team members are to report any suspected unsafe conditions to the site health and safety coordinator and stop working if emergency conditions arise.

2.2.5 Subcontractors

Subcontractors must be trained in accordance with 29 CFR Section 1910.120 prior to their admittance to the site and must comply with the training requirements specified in Section 6 of this HSP to the extent they will be performing work under the contractor's direction. **As with all subcontractors, the responsibility for protecting the health and safety of subcontractor employees rests with the subcontractor; therefore, the subcontractor must submit an HSP to the Health and Safety Manager that identifies safety procedures for the field activities to be performed. Before beginning any field activity, the subcontractor must provide to the site health and safety coordinator documentation of necessary training and proof of participation in a medical monitoring program.** This documentation will be kept in the project file.

TABLE 2.1

CONTRACTOR IRP PERSONNEL

Program Manager	Peter Crowley (703) 591-7575
Project Manager	Peter M. Petrone, P.E. (315) 451-9560
Program Health and Safety Manager	Brian J. Powell, CIH, CSP (315) 451-9560
Field Manager	Christopher R. Torell (315) 451-9560
Site Health and Safety Coordinator	Christopher R. Torell (315) 451-9560

SECTION 3

EMERGENCY RESPONSE PLAN

3.1 PERSONNEL ROLES AND LINES OF AUTHORITY

The Site Health and Safety Coordinator or Program Health and Safety Manager supervises the field team to ensure they are meeting health and safety requirements. If deficiencies are noted, work is stopped and corrective action is taken (e.g., purchase of additional safety equipment). Reports of health and safety deficiencies and the corrective action taken is forwarded to the Project Manager and Program Health and Safety Manager.

All contractor personnel receive site-specific health and safety training before starting any site activities. On a day-to-day basis, workers should watch for indicators of potentially hazardous situations and for signs and symptoms in themselves and others that warn of hazardous conditions and exposures. Emergencies can be averted by rapid recognition of dangerous situations. Before assigning daily tasks, tailgate safety meetings will be held by the Site Health and Safety Coordinator. Discussion should include:

- Tasks to be performed;
- Time constraints (e.g., work period duration and rest breaks);
- Hazards that may be encountered, including their effects, how to recognize symptoms or monitor them, and danger signals;
- Emergency procedures; and
- Communication.

3.2 EMERGENCY CONTACTS

In the event of any situation or unplanned occurrence requiring assistance, the appropriate contact(s) should be made from the list below. For emergency situations, contact should first be made with the site coordinator who will notify emergency personnel who will then contact the appropriate response teams. This emergency contacts list must be in an easily accessible location at the site.

Contingency Contacts	Phone Number
Nearest phone located onsite	TBD
Fire Department	911
Sheriff	911
Poison Control Center (Hershey, PA)	(800) 521-6110

Parsons ES Contract Physician (IMA)	(315) 478-1977
Pollution Toxic Chemical Oil Spills	(800) 424-8802
Pennsylvania One Call System, Inc.	(800) 242-1766
Medical Emergency	
Hospital Name	Center Community Hospital
Hospital Phone Number	(814) 423-6111, Emergency
Hospital Address	1800 East Park Ave. State College, PA 16803
Travel Time from Site	5 Minutes
Map to Hospital	Figure 1.1
Ambulance Service	911

3.3 HOSPITAL EMERGENCY ROUTE

Directions to the hospital are as follows:

- East on University to Park Avenue
- North on Park
- Hospital on right past Orchard Road

Figure 1.1 also shows the route to the hospital.

Parsons ES Contacts

Project Manager: Peter M. Petrone	(315) 451-9560
Health & Safety Officer: Brian J. Powell	(315) 451-9560

3.4 EMERGENCY PROCEDURES

3.4.1 Introduction

If an emergency develops on site, the procedures delineated in this site-specific HSP are to be immediately followed. The site-specific HSP should adhere to procedures established in this program health and safety plan. Emergency conditions exist if:

- Any member of the field crew is involved in an accident or experiences any adverse effects or symptoms of exposure;
- A condition occurs that is more hazardous than anticipated; and/or

- Fires, explosions, structural collapses/failures, and/or unusual weather conditions (thunderstorms, lightning, high winds, etc.) occur.

If an emergency occurs, direct voice communication is used to sound the alarm. If personnel are out of range of direct voice communication, an emergency warning signal will be sounded. General emergency procedures and specific procedures for personal injury are described within this section. A list of emergency contacts are provided above and must be posted conspicuously on site.

3.4.2 General Emergency Procedures

The emergency procedures are as follows:

- Notify the contact identified in the emergency contact table of this HSP when an emergency occurs. This list is should be posted prominently at the site;
- Use the "buddy" system (pairs);
- Maintain visual contact between "pairs." Each team member should remain close to the other to assist in case of emergencies;
- If any member of the field crew experiences any adverse effects or symptoms of exposure, the entire field crew will immediately halt work and act according to the instructions provided by the Site Health and Safety Coordinator;
- Any condition that suggests a situation more hazardous than anticipated will result in evacuating the field team and re-evaluating the hazard and the level of protection required; and
- If an accident occurs, the Site Health and Safety Coordinator is to complete an Accident Report Form (See Figure 3.1). Follow-up action will be taken to correct the situation that caused the accident.

3.4.3 Injuries and Illnesses

In case of personal injury at the site, follow the procedures listed below:

- Field team members or onsite emergency medical technicians trained in first aid will administer treatment to an injured worker if appropriate;
- The victim will be transported to the nearest hospital or medical center if necessary. An ambulance will be called to transport the victim if needed; and
- The Site Health and Safety Coordinator is responsible for the completion of an Accident Report Form.

3.4.4 Fire or Explosion

Health and Safety Coordinator shall:

- Notify the paramedics and/or fire department, as necessary;

- Signal the evacuation procedure outlined in this HSP and implement the entire procedure;
- Isolate the area;
- Stay upwind of any fire; and
- Keep area surrounding the problem source clear after the incident occurs.

3.4.5 Hazardous Materials Release

In the event of a spill, immediately contact the local hazardous response team. Emergency contacts, numbers, lines of authority, and evacuation routes are provided above. Federal, state, and local planning or response groups must also be notified.

3.4.6 Standard Safe Work Practices

The following are considered standard safe work practices:

1. Eating, drinking, chewing tobacco, smoking and carrying matches or lighters are prohibited in a contaminated or potentially contaminated area or where the possibility for the transfer of contamination exists;
2. Avoid contact with potentially contaminated substances. Do not walk through puddles, pools, mud, etc. Avoid, whenever possible, kneeling on the ground, leaning or sitting on equipment or ground. Do not place monitoring equipment on potentially contaminated surfaces (i.e., ground, etc.);
3. Acknowledge crew member senses which alert to potentially dangerous situations in which they should not become involved (i.e., presence of strong and irritating or nauseating odors);
4. Prevent spills to the extent possible. In the event that a spill occurs, contain liquid if possible;
5. Field crew members shall be familiar with the physical characteristics of investigations, including:
   - Wind direction in relation to nearby buildings;
   - Accessibility to associates, equipment, vehicles communication;
   - Hot zone (areas of known or suspected contamination);
   - Site access;
   - Nearest water sources;
6. All wastes generated during activities onsite should be disposed of as directed by the project manager or onsite Health and Safety Coordinator; and
7. Protective equipment as specified in Section 7 will be utilized by workers during the excavation and confirmatory sampling procedures.

3.4.7 Personal Protective Equipment Failure

Before donning PPE, workers should fully inspect all PPE. If PPE fails during site work, evacuate the area, remove and dispose of equipment, and replace it with new equipment.

3.5 ACCIDENT/INCIDENT REPORTING

Reporting and investigation of accidents are important parts of any health and safety program. They provide safety personnel with the means for objective evaluation of the progress and effectiveness of the health and safety program. Additionally, they allow the safety officer to identify problem areas where preventive measures can be taken. For corrective or preventive measures to be effective, reports on the causes of the accident must be unbiased. The purpose of an accident report is to obtain information, not to affix blame. .

The Occupational Safety and Health Act (OSHA) requires that certain elements be included in all accident reports (29 CFR Part 1094). These elements are met by the contractor's Accident Report Form (Figure 3.1). The Project Manager or Project Health and Safety Manager is responsible for the documentation of all field injuries. Information concerning a field injury must be reported to the Contractor Program Health and Safety Manager as soon as possible.

FIGURE 3.1
ACCIDENT REPORT FORM

Project Name:_____

INJURED OR ILL EMPLOYEE

1. Name _____ Social Security #_____
   (First) (Middle) (Last)
2. Home Address _____
   (No. and Street) (City or Town) (State and Zip)
3. Age _____ 4. Sex: Male ( ) Female ( )
5. Occupation _____
   (Specific job title, not the specific activity employee was performing at time of injury)
6. Department _____
   (Enter name of department in which injured person is employed, even though they may have been temporarily working in another department at the time of injury)

EMPLOYER

7. Name _____
8. Mailing Address _____
   (No. and Street) (City or Town) (State and Zip)
9. Location (if different from mailing address):_____

_____

THE ACCIDENT OR EXPOSURE TO OCCUPATIONAL ILLNESS

10. Place of accident or exposure _____
    (No. and Street) (City or Town) (State and Zip)
11. Was place of accident or exposure on employer's premises? _(Yes/No)

FIGURE 3.1 (CONT'D)
ACCIDENT REPORT FORM

12. What was the employee doing when injured?_____

_____

(Be specific - was employee using tools or equipment or handling material?)

_____

13. How did the accident occur? _____

(Describe fully the events that resulted in the injury or

_____

occupational illness. Tell what happened and how. Name objects and

_____

substances involved. Give details on all factors that led to accident. Use separate sheet if needed)

14. Time of accident: _____

15. Date of injury or initial diagnosis of occupational illness _____

(Date)

16. WITNESS TO ACCIDENT

(Name)	(Affiliation)	(Phone No.)
(Name)	(Affiliation)	(Phone No.)
(Name)	(Affiliation)	(Phone No.)

OCCUPATIONAL INJURY OR OCCUPATIONAL ILLNESS

17. Describe the injury or illness in detail; indicate part of body affected.

_____

_____

FIGURE 3.1 (CONT'D)
ACCIDENT REPORT FORM

18. Name the object or substance which directly injured the employee. (For example, object that struck employee; the vapor or poison inhaled or swallowed; the chemical or radiation that irritated the skin; or in cases of strains, hernias, etc., the object the employee was lifting, pulling, etc.)

_____

_____

19. Did the accident result in employee fatality? _____ (Yes or No)

20. Number of lost workdays ____/restricted workdays _____ resulting from injury or illness?

OTHER

21. Did you see a physician for treatment? _____ (Yes or No) _____ (Date)

22. Name and address of physician _____

_____

(No. and Street) (City or Town) (State and Zip)

23. If hospitalized, name and address of hospital _____

_____

(No. and Street) (City or Town) (State and Zip)

Date of report _____ Prepared by _____

Official position _____

SECTION 4
ACTIVITY HAZARD ANALYSIS

4.1 INSTALLATION RESTORATION PROGRAM ACTIVITY HAZARD ANALYSIS

While working on hazardous waste sites on ANGRC Bases, contractor personnel are likely to encounter chemical and physical hazards. These hazards are associated primarily with preparation for sampling, sampling and/or remediation activities. The chemical and physical hazards are detailed in Section 5, however, the site specific activity analysis for the proposed drywell excavation at Site 2 is provided in Table 4.1.

TABLE 4.1
ACTIVITIES AND HAZARDS FOR DRYWELL EXCAVATION AT SITE 2

Activity	Potential Chemical Hazard	Potential Physical Hazard	OSHA Standard
Subsurface Soil Sampling	Potential exposure to chlorinated solvents and petroleum/fuel components.	Heavy machinery, underground utilities, heat stress, slip, trip, fall hazard, wires or rope breaking, potential head injury or impact, explosive vapors, splash hazard, and temperature extremes.	29 CFR 1926.850 Subpart O 29 CFR 1926.651 29 CFR 1926.25 29 CFR 1926.251 29 CFR 1926.100
Surface Water and Sediment Sampling	Potential inhalation and dermal exposure to chlorinated solvents, and petroleum/fuel components.	Splash Hazard Temperature extremes	29 CFR 1926.102
Oversight/Site Reconnaissance	Very low exposure hazard	Heat stress, slip, trip, and fall hazard	29 CFR 1926.25

SECTION 5
SAFETY AND HEALTH ANALYSIS

5.1 CHEMICAL HAZARDS

The chemicals of primary concern which may be encountered at Site 2 will be those originating from previous Vehicle Maintenance Shop Wash Pad activities. Compounds detected during both the 1996 Site Investigation and the 1997 Site Investigation which exceeded soil criterion include trichloroethene (TCE), arsenic, beryllium, lead, and total petroleum hydrocarbons (TPH). Other compounds were also detected, but did not exceed soil criteria. These compounds can be taken into the body by oral ingestion, by absorption through the skin, and by inhalation. The toxicological chemical of concern table is presented in Table 5.1 and includes any compounds detected over 1 ppm in both investigations. Action Levels for Site 2 are discussed in Section 8.11.

In addition to the chemicals which may be present on site, personnel may bring chemicals onto the site (e.g., for equipment decontamination) that could pose health hazards. Material Safety Data Sheets (MSDSs) for these chemicals will be brought on site when used.

5.2 PHYSICAL HAZARDS

5.2.1 Subsurface Hazards

Before any excavation operations are performed, efforts must be made to determine if underground installations, (e.g., sewers, telephone, water, fuel, electrical lines or liners), will be encountered, and, if so, where such underground installations are located. Utility companies and/or facility engineering shall be contacted before starting any subsurface activities and information concerning buried utilities shall be obtained.

5.2.2 Motor Vehicles and Heavy Equipment

Working adjacent to excavators can be a major hazard at a site. Injuries can result from equipment hitting or running over personnel, or from the overturning of vehicles. Vehicles and heavy equipment design and operation will be according to 29 CFR Subpart O, 1926.600 through 1926.602. In particular, the following precautions shall be used by the subcontractor to help prevent injuries and accidents:

- Brakes, hydraulics lines, light signals, fire extinguishers, fluid levels, steering, tires, horn, and other safety devices will be checked and recorded on a log sheet at the beginning of each week; and
- Excavators will not be backed up unless the vehicle has a reverse signal alarm audible above the surrounding noise level or a signal man is present.

Because excavators can be an ignition source, spark arrestors will be included on all excavators as standard equipment. These will prevent sparks from the engine igniting potentially

explosive atmospheres. All heavy equipment will be inspected for the presence of spark arrestors prior to performing work on the site.

5.2.3 Overhead Electrical Lines

Precautions will be exercised when excavating near any overhead electrical lines. The minimum clearance between overhead electrical lines of 50 kilovolts (KV) or less and the excavator is 10 feet. For line rated over 50 KV, the Field Manager will verify that the minimum clearance between the line and any part of the rig is 10 feet plus 0.4 inch for each KV over 50 KV. The site Health and Safety Coordinator will contact the utility company to determine the kilovolts of electrical lines.

5.2.4 Noise-Induced Hearing Loss

Planned activities at Site 2 involve the use of heavy equipment. The unprotected exposure of site workers to this noise during activities can result in noise-induced hearing loss. The site Health and Safety Coordinator will ensure that either earmuffs or disposal foam earplugs are made available to all personnel near sources of high intensity noise.

5.2.5 Slip, Trip, and Fall Hazard

Site 2 may contain slip, trip, and fall hazards for site workers, such as:

- Holes, pits or ditches;
- Slippery surfaces;
- Steep grades;
- Uneven grades; and
- Sharp object, such as nails, metal shards, and broken glass.

Site personnel will be instructed to look for potential safety hazards and immediately inform the site Health and Safety Coordinator or the Field Manager about any new hazards. If the hazards cannot be immediately removed, actions must be taken to warn site workers about the hazard.

5.2.6 Excavations

Excavations greater than four feet in depth that are entered by employees shall be sloped or shored as per 29 CFR 1926 Subpart P. A ladder must be used when employees enter excavations four feet or deeper. Every effort will be made to limit excavations that must be entered to four feet. All OSHA requirements of Subpart P for excavation will be met. If necessary the requirements for confined space entry (OSHA 1910.146) will be followed for entrance into excavations.

5.2.7 Electric and Energized Lines

All electrical equipment and energized lines shall be considered energized until isolated, tested or otherwise determined to be de-energized and grounded. A qualified electrician will

verify all electrical lines that may interfere with work activities are locked out and tagged. To prevent physical contact with energized power lines, equipment or machines shall not be operated within 10 feet of any power line rated at 50 KV or below. This 10-foot rule will strictly be enforced at all times.

Daily inspections on all electrical equipment prior to distribution to employees will be performed by a competent person. Tools that do not pass inspection will be removed from service until repaired or replaced. All tools, cords and receptacles will be tested monthly for ground continuity, correct conductor termination and inspected for defects. All repairs to be made on electrical tools and equipment will be performed by a certified electrician. Records detailing the inspection and repair of electrical equipment will be kept with tool number, type, date inspected, repairs, and other comments.

5.2.8 Biological Hazards

The planned field activities may bring contractor personnel into contact with snakes, spiders, ticks, chiggers, mosquitoes and poisonous plants (poison ivy and poison oak). The following precautions will be taken as necessary by field personnel to avoid contact with biological hazards:

- Hat to ward off insects;
- Snake guards;
- Insect/tick spray, especially on hat, ankles, wrist, and waist (may only be used when not operating a photoionization detector (PID) and not collecting samples);
- Use of Tyvek ™ suit sealed with duct tape at ankles and wrist;
- Use of Oak-N-Ivy™ cleanser or equivalent at field hand-wash station; and
- Wash hands, face, and other exposed skin after each work period, and hot shower at the end of each day.

5.2.9 Sunburn

Sunscreen and/or sun visors should be worn when work must be performed in the heat of the day and where no shelter is available. Shade or air conditioned areas must be available on site for rest periods to reduce the likelihood of heat stress.

5.2.10 Fire or Explosion

Several flammable materials (e.g., fuels, cutting gases, waste oils, etc.) may be stored at or brought onto the site. To reduce the risk of fire and explosion, small quantities of flammable liquids must be stored in approved "safety" cans and labeled according to contents. Bulk storage of flammable materials should only be allowed in areas designated for this purpose. Open flames must be prohibited within 50 feet of flammable storage areas. Flammable materials in confined spaces can produce an explosive atmosphere which can be ignited by a spark or other energy source. OSHA standards for fire protection and prevention, and welding and

cutting are contained in 29 CFR, Subpart F, 1926.150 through 1926.154 and 29 CFR, Subpart J, 1926.350 through 1926.354, respectively. Of particular concern are:

- Proper storage of flammable chemicals;
- Adequate numbers and types of fire extinguishers;
- Proper handling of cutting equipment, cylinders, and hoses;
- Allowing open flames or cutting only in certain locations and with appropriate precautions; and
- Proper use of mechanical or local exhaust ventilation.

Gasoline vapors can be highly explosive, having a flash point of about -40°F. Diesel oil is combustible, with a flash point of 110°F to 190°F, and is considered to be a moderate fire hazard. Ethylene glycol is considered to be a slight fire hazard (flash point of 232°F) and a moderate explosion hazard.

5.2.13 Other Hazards

Other physical hazards at Site 2 may include vehicular traffic. Safe work practices will be used in all ANGRC projects to avoid all unnecessary hazards.

TABLE 5.1
HEALTH HAZARD QUALITIES OF HAZARDOUS SUBSTANCES OF CONCERN AT SITE 2

Compound	PEL [a/] (ppm)	TLV [b/] (ppm)	IDLH [c/] (ppm)	Odor Threshold [d] (ppm)	Ionization Potential [e] (eV)	Physical Description/Health Effects/Symptoms
Benzene	1 [dd/]	10	500	4.7	9.24	Colorless to light-yellow liquid (solid<42°F) with an aromatic odor. Eye, nose, skin, and respiratory system irritant. Causes giddiness, headaches, nausea, staggered gait, fatigue, anorexia, exhaustion, dermatitis, bone marrow depression, and leukemia. Mutagen, experimental teratogen, and carcinogen.
Beryllium	0.002 mg/m^3	0.002 mg/m^3	4 mg/m^3	NA	NA	Hard, brittle, gray-white, metallic solid. Irritates lungs, skin, eyes, and mucous membranes. Causes berylliosis, anorexia, low-weight, weakness chest pain, coughing, blue skin, clubbed fingers, pulmonary insufficiency, dermatitis, and lung cancer. Mutagen and carcinogen.
Butylbenzene (n-,sec-, tert-)	NA	NA	NA	NA	8.69	Colorless liquid, flammable, stable, Flash point = 93 deg. F, Vapor Pressure (VP) = 1.6 mm Hg, LEL = 0.7%, no literature found regarding symptoms of exposure.
Coal Tar Pitch Volatiles	0.2 mg/m^3 [dd/]	0.2 mg/m^3	80 mg/m^3 [g/]	NA	NA	Black or dark-brown, amorphous residue. Properties vary with specific compounds. Irritates eyes, skin, and respiratory tract. Causes dermatitis, bronchitis, and lung, skin, and kidney cancer. Carcinogen.
1,4-Dichlorobenzene (p-DCB)	75	10	150	15-30	8.98	Colorless or white, crystalline, solid insecticide with mothball-like odor. Irritates eyes, skin, and respiratory tract. Causes eye swelling, profuse runny nose, headaches, anorexia, nausea, vomiting, low-weight, jaundice, and cirrhosis. In animals, causes liver and kidney cancer. Mutagen, experimental teratogen, and carcinogen.
1,2-Dichloroethene (DCE) (cis- and trans-isomers)	200	200	1,000	0.085-500	9.65	Colorless liquid (usually a mixture of cis- and trans- isomers), with a slightly acrid, chloroform-like odor. Irritates eyes and respiratory system. CNS depressant. Cis- isomer is a mutagen.
Chlorotoluene (o-Chlorotoluene)	50	50	NA	NA	8.83	Colorless liquid with an aromatic odor. Irritates eyes, skin, and mucous membranes. Causes dermatitis, drowsiness, incoordination, anesthesia, coughing, and liver and kidney injury.

TABLE 5.1
HEALTH HAZARD QUALITIES OF HAZARDOUS SUBSTANCES OF CONCERN AT SITE 2

Compound	PEL [a/] (ppm)	TLV [b/] (ppm)	IDLH [c/] (ppm)	Odor Threshold [d] (ppm)	Ionization Potential [e] (eV)	Physical Description/Health Effects/Symptoms
Ethylbenzene	100	100	800	0.25-200	8.76	Colorless liquid with an aromatic odor. Irritates eyes, skin, and mucous membranes. Causes dermatitis, headaches, narcosis, and coma. Mutagen and experimental teratogen.
Isopropylbenzene (cumene)	NA	50 [skin]	900	NA	8.75	Colorless liquid with a sharp, penetrating aromatic odor. Vapor pressure (VP) = 8 mm Hg, LEL = 0.9%, Class IC flammable liquid Irritates eyes, skin, mucous membranes, Causes headaches, dermatitis, Ingestion causes headache, narcosis, coma. Target organs: Eyes, skin, respiratory system, central nervous system.
Lead	0.05 mg/m^3 [dd/]	0.15 mg/m^3	100 mg/m^3	NA	NA	Heavy, ductile, bluish-gray, soft metal. Irritates eyes. Causes weakness, exhaustion, insomnia, facial pallor, anorexia, low-weight, malnutrition, constipation, abdominal pain, gastritis, colic, constipation, gingival lead line, anemia, wrist and ankle paralysis, joint pains, tremors, low blood pressure, and kidney disease. Mutagen, experimental teratogen, and suspected carcinogen.
Naphthalene	10	10	250	0.3	8.1	Colorless to brown solid (shipped as a molten liquid) with a mothball-like odor. Irritates eyes, skin, and bladder. Causes headaches, confusion, excitement, convulsions, coma, vague discomfort, nausea, vomiting, abdominal pain, profuse sweating, jaundice, hematoma, hemoglobin in the urine, renal shutdown, dermatitis, optic nerve disorders, and corneal and liver damage. Experimental teratogen and questionable carcinogen.
Propyl Benzene (Isocumene)	NA	NA	NA	NA	8.72	Colorless to light-yellow liquid. Irritates eyes, nose, throat, and skin. Causes CNS depression, headaches, anorexia, dizziness, muscular weakness, incoordination, nausea, breathing difficulties, vertigo, mental confusion, and unconsciousness.
Toluene	100	50 (skin)	500	0.2-40 [k/]	8.82	Colorless liquid with sweet, pungent, benzene-like odor. Irritates eyes and nose. Causes fatigue, weakness, dizziness, headaches, hallucinations or distorted perceptions, confusion, euphoria, dilated

TABLE 5.1
HEALTH HAZARD QUALITIES OF HAZARDOUS SUBSTANCES OF CONCERN AT SITE 2

Compound	PEL [a/] (ppm)	TLV [b/] (ppm)	IDLH [c/] (ppm)	Odor Threshold[d] (ppm)	Ionization Potential[e] (eV)	Physical Description/Health Effects/Symptoms
						pupils, nervousness, tearing, muscle fatigue, insomnia, skin tingling, dermatitis, bone marrow changes, and liver and kidney damage. Mutagen and experimental teratogen.
Trichloroethene (TCE)	50	50	1,000	21.4-400	9.45	Clear, colorless or blue liquid with chloroform-like odor. Irritates skin and eyes. Causes fatigue, giddiness, headaches, vertigo, visual disturbances, tremors, nausea, vomiting, drowsiness, dermatitis, skin tingling, cardiac arrhythmia, and liver injury. In animals, causes liver and kidney cancer. Mutagen, experimental teratogen, and carcinogen.
1,2,4-Trimethylbenzene (Pseudocumene)	25	25	NA	0.027	8.27	Colorless liquid with a distinctive, aromatic odor. Irritates eyes, skin, nose, throat, and respiratory system. Causes bronchitis, hypochromic anemia, headaches, drowsiness, fatigue, dizziness, nausea, incoordination, vomiting, confusion, CNS depression, and chemical pneumonia.
1,3,5-Trimethylbenzene (Mesitylene)	25 [ll/]	25 [ll/]	NA	0.027 [ll/]	8.39	Colorless liquid with a distinctive, aromatic odor. Irritates eyes, skin, nose, throat, and respiratory system. Causes bronchitis, hypochromic anemia, headaches, drowsiness, fatigue, dizziness, nausea, incoordination, vomiting, confusion, and chemical pneumonia. Mutagen.
VM&P, Naphtha (Petroleum Ether, Varsol)	300	300	NA	NA	NA	Clear to yellowish liquid with a pleasant, aromatic odor. Irritates eyes and upper respiratory system. Causes dermatitis, CNS depression, and chemical pneumonia.
Xylene (o-, m-, and p-isomers)	100	100	900	0.05-200 [k/]	8.56 8.44 (p)	Colorless liquid with aromatic odor. P-isomer is a solid <56°F. Irritates eyes, skin, nose, and throat. Causes dizziness, drowsiness, staggered gait, incoordination, irritability, excitement, corneal irregularities, conjunctivitis, dermatitis, anorexia, nausea, vomiting, abdominal pain, and olfactory and pulmonary changes. Also targets blood, liver, and kidneys. Mutagen and experimental teratogen.

a/ PEL = Permissible Exposure Limit. OSHA-enforced average air concentration to which a worker may be exposed for an 8-hour workday without harm. Expressed as parts per million (ppm) unless noted otherwise. PELs are published in the *NIOSH Pocket Guide to Chemical Hazards*, 1994. Some states (such as California) may have more restrictive PELs. Check state regulations.

TABLE 5.1
HEALTH HAZARD QUALITIES OF HAZARDOUS SUBSTANCES OF CONCERN AT SITE 2

Compound	PEL [a/] (ppm)	TLV [b/] (ppm)	IDLH [c/] (ppm)	Odor Threshold[d] (ppm)	Ionization Potential[e] (eV)	Physical Description/Health Effects/Symptoms

b/ TLV = Threshold Limit Value - Time-Weighted Average. Average air concentration (same definition as PEL, above) recommended by the American Conference of Governmental Industrial Hygienists (ACGIH), *1994-1995 Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices.*

c/ IDLH = Immediately Dangerous to Life or Health. Air concentration at which an unprotected worker can escape without debilitating injury or health effects. Expressed as ppm unless noted otherwise. IDLH values are published in the *NIOSH Pocket Guide to Chemical Hazards*, 1994.

d/ When a range is given, use the highest concentration.

e/ Ionization Potential, measured in electron volts (eV), used to determine if field air monitoring equipment can detect substance. Values are published in the *NIOSH Pocket Guide to Chemical Hazards*, June 1994.

f/ mg/m^3 = milligrams per cubic meter.

g/ Based on coal tar pitch volatiles.

h/ NA = Not available.

j/ (skin) = Refers to the potential contribution to the overall exposure by the cutaneous route.

k/ Olfactory fatigue has been reported for the compound and odor may not serve as an adequate warning property.

p/ Total dust.

s/ Based on exposure limits for petroleum distillates (petroleum naphtha).

bb/ Indicates that the IDLH value was based on 10% of the lower explosive limit for safety considerations, even though relevant toxicological data indicated that irreversible health effects or impairment of escape existed only at higher concentrations *(NIOSH Pocket Guide to Chemical Hazards, 1994).*

dd/ Refer to expanded rules for this compound.

ll/ Based on 1,2,4-Trimethylbenzene.

SECTION 6

TRAINING AND MEDICAL MONITORING REQUIREMENTS

Training is the foundation upon which all other protective measures depend. All contractor health and safety training programs will cover:

- The contractor health and safety policy;
- Understanding of the hazards of the work;
- Safe work practices;
- Standard health and safety procedures;
- Protective clothing, equipment, or engineering controls (where appropriate);
- Emergency procedures; and
- Contractor's personnel rights and responsibilities under OSHA.

The content and extent of health and safety training will depend on the nature of the work and the responsibilities of the personnel performing the work. At a minimum, all contractor personnel must be given training (1) in the overall contractor health and safety program and (2) ANGRC IRP HSP contents. Additionally, all onsite personnel are required to read and abide by this site-specific HSP.

The medical surveillance program is a major element in the contractor health and safety program. The two major components of the program are (1) routine monitoring of the health of contractor personnel whose work may expose them to health hazards and (2) arrangements for emergency medical care in the event of work-related health emergencies.

6.1 SITE SAFETY TRAINING REQUIREMENTS

All onsite personnel must have received 40 hours of initial training in hazardous waste operations before participating in IRP projects, as required by 29 CFR Part 1910.120(e). All onsite personnel must be up to date on their annual 8-hour refresher training. Prior to beginning site activities, all contractor and subcontractor personnel must present certificates of the above training and evidence of participation in an annual medical monitoring program to the Site Health and Safety Coordinator or Project Manager. Additionally, CPR and first aid certification will be required for onsite personnel. This information will be kept in the project files.

Prior to beginning work on a site, the Site Health and Safety Coordinator will provide a briefing that covers the following topics:

- History of site;
- Hazards at the site;
- Proper use of personal protective equipment;

- Work practices by which the employee can minimize risk from hazards;
- Work zones and their locations, and the level of protection to be used in each zone on the site;
- Acute effects of compounds at the site;
- Decontamination procedures; and
- Emergency procedures, evacuation routes, and emergency telephone numbers.

Tailgate safety meetings will be held daily and as appropriate as site tasks or safety conditions change (i.e., PPE upgrade, weather condition change). Topics covered will include a review of the anticipated activities, the appropriate safety procedures, and any associated physical or chemical hazards. The meeting will be recorded on the tailgate safety meeting form (Figure 6-1). All personnel attending the meeting must sign the form. Records of this training will be maintained in the project files.

6.2 MEDICAL MONITORING REQUIREMENTS

Personnel engaged in hazardous waste operations are required to be enrolled in a medical monitoring program as required by 29 CFR Part 1910.120(f). The medical monitoring program is conducted using the services of licensed, local occupational physicians. All examinations will include tests and analyses appropriate to the nature of the work the employee will be required to perform.

6.2.1 Pre-placement Screening

All contractor personnel who will be involved in the medical monitoring program must have an initial physical examination before assignment to work requiring regular health monitoring. The pre-placement screening has two major functions: (1) to determine contractor personnel's fitness for duty, including the ability to work while wearing protective equipment and (2) to establish a baseline physiological profile for comparison with future medical data.

6.2.2 Periodic Medical Examinations

Periodic medical examinations will be given. Comparison of sequential medical reports with baseline data is essential to determine physiological changes that may mark early signs of adverse health effects and, thereby, may facilitate appropriate protective measures.

The frequency and content of examinations will vary, depending on the nature of the work and exposure. Generally, medical examinations have been recommended annually. More frequent examinations may be necessary, depending on the extent of potential or actual exposure, the duration of the work assignment, and the individual worker's profile.

6.2.3 Termination Examination

A physical examination shall be performed as a part of the checkout procedure for terminating contractor personnel.

6.2.4 Special Examination

Special medical examinations, care, and counseling will be provided in cases of known exposures to toxic substances. Any special tests performed would depend on the substance to which the person was exposed.

6.2.5 Subcontractor's Medical Certification

Subcontractors that are to work at hazardous waste sites must furnish to the Project Manager or Site Health and Safety Coordinator a doctor's certification of each assigned worker's ability to wear personal protective equipment. The certification should be dated not more than one year before subcontractor personnel begin onsite work.

6.2.6 Medical Records

The contractor will keep in a locked file the physician's opinion on specific findings or diagnoses. When a worker terminates employment, the medical file should be archived for 30 years.

FIGURE 6.1

Tailgate Health and Safety Meeting

Date:

Specific Location:

Safety Topics Presented:

Protective Clothing/Equipment:

Chemical Hazards:

Physical Hazards:

Other:

Attendees: Name Printed:	Signature

MEETING CONDUCTED BY

Name Printed	Signature

SECTION 7

PROTECTIVE EQUIPMENT

7.1 PURPOSE

These guidelines are provided to establish a personal protective equipment and safety equipment program for hazardous waste operations.

7.2 GUIDELINE

Personal protective equipment (PPE) is needed to ensure the health and safety of field personnel involved with hazardous substances. It can only provide a high degree of protection if it is used properly. Clothing is selected by evaluating the performance characteristics of the clothing against the requirements and limitations of the site- and task-specific conditions. The following areas must be addressed for an effective PPE program:

- Training;
- Work duration;
- Fit testing;
- Donning of equipment;
- In-use monitoring;
- Doffing of equipment;
- Inspection; and
- Storage.

7.3 CONSIDERATIONS FOR CHOICE OF PROTECTIVE CLOTHING

7.3.1 Performance Requirement

Clothing must be able to withstand a variety of physical abuses. The advantages and disadvantages of reusable versus disposable clothing must be considered.

7.3.2 Construction Requirements

The construction requirements of any garment depend on the intended use of the garment. The material that the garment is made of has been selected because of its effectiveness as a barrier against specific hazards there is no such thing as "universal" protection.

1. The physical construction of the garment must prevent penetration (e.g., location of seams and zippers, size of clothing); and

2. The material that the garment is constructed of must resist penetration. In some instances, it may be necessary to layer protective clothing to achieve the desired protection.

7.3.3 Permeation Rate

Permeation rate is affected by a combination of the base material, the nature of the chemicals to which the material is exposed, and the duration and nature of exposure. Most materials allow some degree of permeation.

7.3.4 Ease and Cost of Decontamination

Considerations that should be made upon purchasing garments are the ability and degree to which the garment can be decontaminated and the cost of decontamination. Disposable clothing may be advantageous in some situations; however, such clothing is rather expensive in the long run. In most instances, field personnel will use a combination of disposable and reusable clothing.

7.3.5 Protective Materials

The following materials are generally available for a number of garments:

1. Cellulose or paper;
2. Natural and synthetic fibers;
   - Tyvek,™ and
   - Nomex;™
3. Elastomers;
   - Polyethylene,
   - Saran ™-Dow-product,
   - Polyvinyl chloride,
   - Neoprene,
   - Butyl rubber,
   - Chlorapel,™ and
   - Viton.™

Materials such as Tyvek™ or paper offer little or no protection against hazardous contaminants. Such materials can, however, protect against particulate contaminants. Tyvek™ should be used as an outer covering over the primary protective gear such as splash or fully encapsulating suits. Although Tyvek™ provides little chemical resistance, it does limit the amount of direct contamination on the primary protective gear. Tyvek™ garments are disposable.

Elastomers (polymeric materials that, after being stretched, return to about their original length) provide the best protection against chemical degradation, permeation, and penetration from toxic and corrosive liquids or gases. Elastomers are used in boots, gloves, overalls, and fully encapsulating suits. They are sometimes combined with a flame-resistant fabric called Nomex™ to enhance durability and protection.

The abilities of elastomers to resist degradation and permeation range from poor to excellent. The selection of a particular material should be based on its resistance to chemical degradation, as well as on its ability to resist permeation.

Protective clothing containing significant amounts of polyester or other synthetic fibers have the ability to build a static electricity charge from the wearer's movements. If the project site requires non-sparking uniforms due to explosion hazards, cotton/polyester blends for coveralls should be avoided. Zippers manufactured from brass which is non-sparking, should be used on projects where explosion hazards are a concern.

7.3.6 Types of Protective Clothing

Each type of protective clothing has a specific purpose; many, but not all, are designed to protect against chemical exposure. Table 7.1 describes the types of protective clothing available, details the protection they offer, and lists factors to consider in their selection and use.

7.4 SELECTION OF WORK ENSEMBLE

7.4.1 Protection Level

The individual components of clothing and equipment must be assembled into a full protective ensemble that both protects the worker from the site-specific hazards and minimizes the hazards and drawbacks of the personal protective equipment ensemble itself. Protective clothing selected should provide the maximum chemical protection available while allowing flexibility, dexterity, and visibility. These benefits of protective clothing must often be weighed and compared against increased risk of heat stress. Protective equipment selection must be coordinated with the site Health and Safety Coordinator or Program Health and Safety Manager.

7.4.2 Training

Training in PPE use is required as part of the initial training for all working at any ANGRC hazardous waste site. This training allows the user to become familiar with the equipment in a non-hazardous environment. As a minimum, the PPE training portion should delineate the user's responsibilities and explain the following:

1. OSHA requirements as delineated in 29 CFR Part 1910 Subparts I and Z;
2. The proper use and maintenance of the selected PPE, including capabilities and limitations;
3. Instruction in inspecting, donning, checking, fitting, and using PPE;

4. Individualized respirator fit testing to ensure proper fit;
5. The user's responsibility (if any) for decontamination cleaning, maintenance, and repair of PPE; and
6. Emergency procedures and self-rescue in the event of PPE failure.

7.4.3 Work Mission Duration

Before entering a hazardous waste site in personal protective equipment, the anticipated work mission duration must be established in the project health and safety plan. Several factors limit the work mission length. These are:

1. Air supply;
2. The permeation and penetration rates of chemical contaminants; and
3. Ambient temperature.

7.4.4 Donning of Equipment

Periodic practice for donning chemical resistant clothing and respirators are required. Assistance should be provided because donning and doffing operations are difficult to perform alone.

After the equipment has been donned, the fit should be evaluated. Clothing that is too small will restrict movement, thus increasing the possibility of tearing the suit and increasing worker fatigue. Clothing that is too large increases the possibility of snagging the suit and the worker's dexterity and coordination may be compromised. In each instance, the worker should be recalled and refitted.

7.4.5 In-Use Monitoring

The wearer of protective clothing must understand all aspects of the clothing's operation and limitation. This is particularly important for fully-encapsulating ensembles where misuse could result in suffocation.

Worker should report any perceived problems or difficulties with equipment to their Project Health and Safety Officer. These malfunctions include, but are not limited to:

- Degradation of protective clothing;
- Perception of odor while wearing a respirator;
- Skin irritation;
- Resistance in breathing during respirator use;
- Fatigue because of respirator use;
- Vision or communication difficulties; and
- Personal responses such as rapid pulse, chest pain, and nausea.

If a supplied-air respirator is being used, all hazards that might endanger the integrity of the air line should be removed from the working area before use. During use, air lines should be kept as short as possible and other workers and vehicles should be excluded from the area.

7.4.6 Doffing of Equipment

Procedures for removing chemically-resistant suit/SCBA ensembles must be developed and followed precisely to prevent the spread of contaminants from the work area to the wearer's body, and to decontamination personnel. Doffing should be performed in concert with the decontamination of the suited worker. Throughout the doffing procedure, both the worker and decontamination personnel should avoid direct contact with the outside surface of the suit.

7.4.7 Inspection

An effective PPE program will consist of three different inspections:

1. Inspection of equipment as it is issued to workers;
2. Inspection after use in training; and
3. Periodic inspection of stored equipment.

Each inspection will cover different areas in varying degrees of detail. Explicit inspection procedures are usually available from the manufacturer. The inspection checklists provided in Table 7.2 will also be an aid. It is the responsibility of the field worker to inspect the integrity of his or her equipment before use on a site.

Records must be maintained of all inspection procedures. Identification numbers should be assigned to all reusable pieces of equipment (ID numbers) and records should be kept by that number. As a minimum, each inspection should record the ID number, date, inspector, findings, and any future actions to be taken. Periodic review of these records may indicate an item or type of item with excessive maintenance costs or a high level of down time.

7.4.8 Storage

Clothing and respirators must be properly stored to prevent damage or malfunction due to exposure to dust, moisture, sunlight, temperature extremes, and impact. Procedures should be developed for pre-issuance warehousing and post-issuance (in-use) storage. Improper storage can cause equipment failures.

7.5 PROTECTION LEVELS

7.5.1 Level A

Level A protection should be used when percutaneous hazards exist or where there is no known data to rule out percutaneous hazards. Because wearing a fully encapsulated suit is physiologically and psychologically stressful, the decision to use this protection must be carefully considered. The following conditions suggest a need for Level A protection.

1. The hazardous substance has been identified and requires the highest level of protection for skin, eyes, and the respiratory system based on either the measured (or potential for) high concentration of atmospheric vapors, gases, or particulates; or based on the site operations and work functions involve a high potential for splash, immersion, or exposure to unexpected vapors, gases, or particulates of materials that are harmful to skin or capable of being absorbed through the intact skin;
2. Substances with a high degree of hazard to the skin are known or suspected to be present, and skin contact is possible; and
3. Operations must be conducted in confined, poorly ventilated areas and the absence of conditions requiring Level A have not yet been determined.

The following items constitute Level A protection:

1. Pressure-demand, full-face piece, self-contained breathing apparatus (SCBA), or pressure-demand supplied-air respirator with escape SCBA, approved by the National Institute for Occupational Safety and Health (NIOSH);
2. Totally-encapsulating chemical-protective suit;
3. Coveralls;
4. Long underwear;*
5. Gloves, outer, chemical resistant;
6. Gloves, inner, chemical resistant;
7. Boots, chemical-resistant, steel toe and shank;
8. Hard hat (under suit);*
9. Disposable protective suit, gloves, and boots (depending on suit construction, may be worn over totally-encapsulating suit); and
10. Two-way radios (worn inside encapsulating suit).

Before a fully encapsulated suit can be worn into a hazardous situation the suit must be properly inspected. The following is a checklist for visually inspecting all types of fully encapsulated suits.

1. Spread suit out on flat surface;
2. Examine the following:
   a. Fabric and seams for abrasions, cuts, or holes,
   b. Zippers and other connecting devices for proper sealing,
   c. Visor for dirt and cracks, and

* Optional, as applicable

d. Exhaust valves (if applicable) for inhibiting debris and proper functioning;

3. If air source is available, seal the suit and inflate it. Check for any leaks on surface and seams using a mild soap solution; and

4. Record each suit's inspection, use, and repair status.

7.5.2 Level B

Level B protection should be worn when the highest level of respiratory protection is necessary, but a lesser level of skin protection is needed. The following conditions constitute a need for Level B protection.

1. Atmospheres with concentrations of known substance greater than protective factors associated with full-face, air-purifying respirators;

2. The atmosphere contains less than 19.5 percent oxygen;

3. Site operations make it highly unlikely that the small, exposed areas of the head or neck will be contacted by splashes of extremely hazardous substances; and

4. Type(s) and concentration(s) of vapors in air do not present a cutaneous or percutaneous hazard to the small, unprotected areas of the body.

The following items constitute Level B protection:

1. Pressure-demand, full-face piece, self-contained breathing apparatus (SCBA), or pressure-demand supplied air respirator with escape SCBA (NIOSH approved);

2. Hooded chemical-resistant clothing (overalls and long-sleeved jacket, coveralls, one or two-piece chemical splash suit; disposable chemical-resistant overalls);

3. Coveralls;*

4. Gloves, outer, chemical-resistant;

5. Gloves, inner, chemical-resistant;

6. Boots, outer, chemical-resistant, steel toe and shank;

7. Boot covers, outer, chemical-resistant (disposable);*

8. Hard hat;

9. Two-way radios;* and

10. Face shield.*

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* Optional, as applicable

7.5.3 Level C

Level C protection should be worn when the type(s) of airborne substance(s) is measured, and the criteria for using air-purifying respirators are met. The following conditions suggest a need for Level C protection:

1. The atmospheric contaminants, liquid splashes, or other direct contact will not adversely affect or be absorbed through any exposed skin;
2. The types of air contaminants have been identified, concentrations measured, and a canister or cartridge respirator is available that can remove the contaminants; and
3. All criteria for the use of air-purifying respirators are met.

The following items constitute Level C protection:

1. Full-face or half-mask, air-purifying canister or cartridge equipped respirators (NIOSH approved);
2. Hooded chemical-resistant clothing (overalls; two-piece, chemical-splash suit; disposal, chemical-resistant overalls);
3. Coveralls;*
4. Gloves, outer, chemical-resistant;
5. Gloves, inner, chemical-resistant;
6. Boots (outer), chemical-resistant, steel toe and shank;*
7. Boot covers, outer, chemical-resistant (disposable);*
8. Hard hat;*
9. Escape mask;*
10. Two-way radios;* and
11. Face shield.*

7.5.4 Level D

Level D protection should not be worn on any site where respiratory or skin hazard exist. Level D protection should be used when:

1. The atmosphere contains no known hazard; and
2. Work functions preclude splashes, immersion, or the potential for unexpected inhalation of or contact with hazardous levels of any chemicals.

The following items constitute Level D protection:

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* Optional, as applicable.

1. Coveralls;
2. Gloves;*
3. Boots/shoes, chemical-resistant, steel toe and shank;
4. Boots, outer, chemical-resistant (disposable);*
5. Safety glasses or chemical splash goggles;*
6. Hard hat;*
7. Escape mask; * and
8. Face shield.*

The type of clothing used and the overall level of protection should be reevaluated periodically as information about the site increases and as workers perform different operations. The Project Health and Safety Officer will determine when to upgrade or downgrade the level of protection for site personnel.

Reason to upgrade:

1. Known or suspected presence of dermal hazards;
2. Occurrence or likely occurrence of gas or vapor emission;
3. Change in work task that will increase contact or potential contact with hazardous materials; and
4. Request of the individual performing the task.

Reasons to downgrade:

1. New information indicating that the situation is less hazardous than was originally thought.
2. Change in site conditions that decreases the hazard.
3. Change in work task that will reduce contact with hazardous materials.

7.6 SAFETY EQUIPMENT

Additional safety equipment should be located in the support zone (discussed in Section 10) for use in the event of an emergency. This equipment should be centrally located with respect to the project site and kept free of all obstructions for ease of access. This is a general list of safety equipment to be used at the site.

- Portable fire extinguisher (Type ABC);
- Industrial first aid kit;
- Additional eye and face protection (glasses, goggles, face shields);
- Hearing protection;

- Additional PPE (Tyvek®, over-boots, duct tape, hard hats);
- Decontamination water;
- Drinking water; and
- Spill kit (sorbent pads or equivalent).

7.7 SITE SPECIFIC PPE REQUIREMENTS

All work will begin in Level D PPE as described above. If soil samples must be handled directly by personnel, outer Nitrile and inner Latex gloves shall be used.

Higher levels of PPE are not anticipated for this excavation, however an upgrade of protection levels will be completed if conditions warrant as described in Section 7.5.4. or as prescribed in air monitoring requirements as specified in the action level table in section 8.11

TABLE 7.1

PROTECTIVE CLOTHING AND ACCESSORIES

Type of Clothing or Accessory	Description	Type of Protection
Fully encapsulating suit	One-piece garment. Boots and gloves may be integral; attached and replaceable, or separate.	Protects entire body against splashes, dust, gases, and vapors.
Non-encapsulating suit	Jacket, hood, pants, or bib overalls, and one-piece coveralls.	Protects body against splashes, dust, and other materials but not against gases and vapors. Does not protect parts of head or neck.
Aprons, leggings, and sleeve protectors	Fully sleeved and gloved apron. Separate coverings for arms and legs. Commonly worn over no-encapsulating suit.	Provides additional splash protection of chest, forearms, and legs.
Firefighters' protective clothing	Gloves, helmet, running or bunker coat, running or bunker pants (NFPA No. 1971, 1972, 1973), and boots.	Protective against heat, hot water, and some particles. Does not protect against gases and vapors, or chemical permeation or degradation. NFPA Standard No. 1971 specifies that a garment consist of an outer shell, an inner liner, and a vapor barrier with a minimum water penetration of 25 lb/in^2 (1.8 kg/cm^2) to prevent the passage of hot water.
Safety helmet	Hard plastic or rubber hat.	Protects the head from blows. Helmets shall meet OSHA Standard 29 CFR
Face Shield	Full-face coverage, eight-inch minimum.	Protects face and eyes against chemical splashes.
Safety glasses	Plastic or glass lenses with side shields.	Protects eyes against large particles and projectiles. Safety glasses shall meet OSHA Standard 29 CFR Part 1910.133.

TABLE 7.1 (continued)

PROTECTIVE CLOTHING AND ACCESSORIES

Type of Clothing or Accessory	Description	Type of Protection
Goggles	Plastic lenses, flexible fitting.	Depending on their construction, goggles can protect against vaporized chemicals, splashes, large particles, and projectiles (if constructed with impact-resistant lenses). Goggles shall meet OSHA Standard 29 CFR Part 1910.133.
Gloves and sleeves	May be integral, attached, or separate from other protective clothing.	Protects hands and arms from chemical contact.
	Overgloves.	Provides supplemental protection to the wearer and protects more expensive undergarments from abrasions, tears, and contamination.
Safety Boots	Boots constructed of chemical-resistant materials (i.e., neoprene, nitrile, butyl rubber, etc.).	Protects feet from contact with chemicals.
	Boots constructed with some steel materials (e.g., toes, shanks, insoles).	Protects feet from compression, crushing, or puncture by falling, moving, or sharp objects. All boots must meet specifications required by OSHA (29 CFR Part 1910.136:).
	Boots constructed from nonconductive, spark-resistant materials or coatings.	Protects the wearer against electrical hazards and prevents ignition of combustible gases or vapors.
Disposable shoes or boot covers	Made of a variety of materials. Slip over the shoe or boot.	Protects safety boots from contamination. Protects feet from contamination.

SOURCE: NIOSH, OSHA, USCG, EPA. 1985. Occupational Safety and Health Guidance Manual For Hazardous Waste Site Activities.

TABLE 7.2

SAMPLE PPE INSPECTION CHECKLIST

Clothing

To be done before use:

- Determine that the clothing material is correct for the specific task at hand.
- Visually inspect for:
  - imperfect seams
  - non-uniform coatings
  - tears
  - malfunctioning closures
- Hold up to light and check for pinholes.
- Flex product:
  - observe for cracks
  - observe for other signs of shelf deterioration
- If the project has been used previously, inspect inside and out for signs of chemical attack:
  - discoloration
  - swelling
  - stiffness

To be done during the work task:

- Evidence of chemical attack (e.g., discoloration, softening, etc.). Chemical permeation can occur without visible signs.
- Tears
- Punctures
- Seam discontinuities

TABLE 7.2 (Continued)

SAMPLE PPE INSPECTION CHECKLIST

Gloves

To be done before use:

- Pressurize the gloves to check for holes. Either flow into glove, then roll gauntlet towards fingers or inflate glove and hold under water. In any event, no air should escape.

Air-Purifying Respirator

The respirator shall be inspected after each cleaning and before each use. The following items, at a minimum, must be addressed in the course of each inspection:

- Cartridges are fresh and of the appropriate type for the contaminant(s) encountered (check before use).
- Cartridge receptacle gaskets are present (two each).
- Inhalation valve seats and flapper valves are in place (two each).
- Exhalation flapper valve is in place.
- The speaking diaphragm and gasket are in place.
- The lens ring is secure with two nuts.
- The respirator is capable of maintaining a negative and positive pressure seal when fully assembled.

Self-Contained Breathing Apparatus (SCBA)

The following list of items must be addressed by the user immediately before donning of SCBAs. Any malfunction found should be cause to set the unit aside until it can be repaired by a certified repair person.

- Check all connections for tightness.
- Check material conditions for:
  - signs of pliability.
  - signs of deterioration.
  - signs of distortion.

TABLE 7.2 (Continued)

SAMPLE PPE INSPECTION CHECKLIST

- Check for proper setting and operation of regulators and valves (according to manufacturer's instructions).
- Check operation of low pressure alarm.
- Check face shield and lense for:
  - cracks
  - crazing
  - fogginess

SCBAs shall be inspected once a month by the Health and Safety Manager or site H&S coordinator to ensure that they are working properly. Monthly inspection involve the following:

- The routine checkout procedure used by personnel before every use of an SCBA must be repeated.
- A complete physical examination must be made of all external working parts on a monthly basis.
- Gaskets, seals, and rubber parts are examined for pliability and signs of deterioration.
- A physical examination of the diaphragm, diaphragm spring, and lever assembly must be made.

SCBAs must be checked twice a year on a portable regulator tester to ensure that the regulator is mechanically sound. Checks on the regulator tester must include the following:

- Static Pressure check.
- Airflow performance test.
- A test for excess aspiration of the regulator.

Air tanks must also be hydrostatically tested to ensure soundness. Aluminum cylinders wound in fiberglass must be tested every three years, steel cylinder need only be tested every five years. All test dates must be recorded in the inspection log book for SCBAs.

TABLE 7.2 (Continued)

SAMPLE PPE INSPECTION CHECKLIST

Clothing

- Contaminated clothing should be stored in an area separate from street clothing.
- Contaminated clothing should be stored in a well-ventilated area.
- Different types of materials of clothing and gloves should be stored separately to prevent issuing the wrong material by mistake.

Respirators

- SCBAs and air-purifying respirators should be dismantled, washed, and disinfected after each use.

SECTION 8

HEALTH HAZARD ASSESSMENT

8.1 PURPOSE

OSHA, in 29 CFR Part 1910.120 (h), requires air monitoring to be used to identify and quantify airborne concentrations of hazardous substances. The purpose of this guideline is to establish fundamental air monitoring principles that can be used to evaluate potential risks at a site. Section 8.2 through 8.10 provide general information regarding monitoring, instruments, and training. Section 8.11 provides site-specific monitoring requirements for Site 2 remedial activities. Section 8.12 provides a site-specific community air monitoring plan.

8.2 GUIDELINE

Various dangers may exist when working at a hazardous waste site. Explosive vapors, oxygen deficient atmospheres, and a variety of toxic gases and vapors can be encountered with lethal properties.

When first approaching a waste site, the potential hazards must be recognized and exposure risks evaluated. This can be done by a methodical initial site survey. To perform initial site surveys and subsequent monitoring, various portable instruments must be available. The following sections describe the types of air monitoring that can be performed and how to interpret monitoring results.

8.3 INITIAL SITE SURVEY AIR MONITORING

Site surveys provide the information needed to identify potential site hazards and to select worker respiratory protection methods and equipment. Site surveys generally proceed in three phases:

- Conduct off-site characterization before site entry. Gather information away from the site by consulting or inspecting site owner's files, agency personnel and files, former site employees, and other applicable literature and personnel. Conduct a reconnaissance from the site perimeter;
- Next, conduct onsite surveys. During this phase, restrict site entry to reconnaissance personnel; and
- Once the site has been determined safe for beginning other activities, perform ongoing monitoring to provide a continuous source of information about site conditions.

It is important to recognize that site characterization is a continuous process. At each phase of site characterization, information shall be obtained and evaluated to define the potential hazards of the site.

The following information (to the extent it is available) shall be obtained before perimeter reconnaissance or initial site entry:

- Location and approximate size of the site;
- Description of the response activity or the job task to be performed;
- Duration of the planned employee activity;
- Site topography;
- Meteorologic data such as prevailing wind direction, precipitation levels, and temperature profiles;
- Site accessibility by air and roads;
- Pathways for hazardous substance dispersion;
- Present status and capabilities of emergency response teams (including contact names and phone numbers) that would provide emergency assistance to onsite employees;
- Hazardous substances and health hazards present or expected at the site and their chemical and physical properties; and
- All suspected conditions that may pose inhalation or skin absorption hazards that are immediately dangerous to life or health (IDLH) or other conditions that may cause death or serious harm shall be identified during the preliminary site characterization and carefully evaluated during the initial site entry and subsequent site surveys.

8.3.1 Perimeter Reconnaissance

Following the data-gathering exercise, and at a site where the hazards are largely unknown, a perimeter reconnaissance should be conducted. Reconnaissance personnel should use Level D or C protection as appropriate. Portable air monitoring instruments should be used, particularly when working downwind of the site. The perimeter reconnaissance should be conducted by at least two individuals. The Project Health and Safety Coordinator should be present. The perimeter reconnaissance should involve the following actions:

- Develop a preliminary site map and review available aerial photography;
- Note any labels, markings, or placards on containers or vehicles;
- Note the amount of deterioration or damage of containers;
- Note any biological indicators, such as dead animals or plants;
- Note any unusual conditions such as clouds or vapors, discolored liquids, or soil staining;
- Note any unusual odors; and
- Collect and analyze offsite soil, water, or air samples as appropriate.

8.3.2 Initial Site Entry

OSHA requires that an ensemble of PPE shall be selected and used during the initial site entry that will provide protection to a level of exposure below established PELs for known or suspected hazardous substances and other safety and health hazards identified during the preliminary site evaluation (29 CFR Part 1910.120[c]).

In the rare instance when the preliminary site evaluation does not produce sufficient information to identify the hazards or suspected hazards of the site, Level B respiratory protection (SCBA) and appropriate protective clothing shall be used as minimum protection for the initial site entry. Direct reading instruments shall be used for identifying IDLH conditions. If available information indicates that Level B protection is not required for initial site entry, and if respiratory protection is warranted by the potential hazards identified during the initial site investigation, an escape SCBA of at least five minutes duration shall be carried by each employee or kept at their immediate work station (29 CFR Part 1910.120[c][5]).

The initial site entry team should consist of three persons: two workers who will enter the site and one outside support person, suited in PPE and prepared to enter the site in case of emergency. It is important that the Project Health and Safety Coordinator be present as one of the team members. Entry personnel should:

- Use monitoring instruments to monitor the air for IDLH and other safety or health conditions that may cause death or serious injury;
- Note the types and condition of containers, impoundments, or other storage systems;
- Note the physical condition of the hazardous substances;
- Determine potential pathways for dispersion; and
- Collect air, water, and soil samples.

8.4 AIR MONITORING INSTRUMENTS

Airborne contaminants may pose a significant threat to worker health and safety, and identification and quantification of airborne contaminants is essential for a good health and safety program at a hazardous waste site. Reliable measurements of airborne contaminants are needed for:

- Selecting personal protective equipment;
- Delineating areas where protection is needed;
- Assessing the potential health effects of exposure; and
- Determining the need for specific medical monitoring.

8.4.1 Measuring Instruments

The purpose of air monitoring is to identify and quantify airborne contaminants to determine the level of worker protection needed. Two principal approaches are available for identifying and quantifying airborne contaminants:

- The onsite use of direct-reading instruments; and
- Laboratory analysis of air samples obtained by gas sampling bag, filter, sorbent, or wet-contaminant collection methods.

8.4.2 Direct-Reading Instruments

Direct-reading instruments are used for rapid detection of flammable or explosive gases, oxygen deficiency, and specific gases and vapors. The information provided by these instruments must be used to institute appropriate protective measures.

It is important that direct-reading instruments be operated by trained individuals who are familiar with the device's operating principles and limitations. At hazardous waste sites where unknown and multiple contaminants are usually the rule, instrument readings should be interpreted conservatively. The following guidelines should be used to facilitate accurate recording and interpretations:

- Calibrate instruments according to the manufacturer's instructions;
- Develop chemical response curves if these are not provided by the instrument manufacturer;
- A reading of zero should be reported as "no instrument response" rather than "clean" because quantities of chemicals may be present that are not detectable by the instrument; and
- The survey should be repeated with several detection systems to maximize the number of chemicals detected.

A description of the direct reading instruments commonly used at ANGRC sites is presented below.

8.4.2.1 Oxygen-Deficient Atmospheres

At sites where oxygen depletion or displacement is anticipated, oxygen levels must be monitored by the use of a portable oxygen detector. A typical oxygen detector measures the percent oxygen in the immediate atmosphere using a galvanic cell. Terrain variations in the land and unventilated rooms or areas often do not contain enough oxygen to support life, making these instruments invaluable to response personnel. The normal ambient oxygen concentration is 20.8 percent.

NIOSH requires that if oxygen levels in the ambient air become less than 19.5 percent, supplied air respirators must be worn. Oxygen-enriched atmospheres (oxygen greater than 25 percent) increase the potential for fire or explosion; no work or testing should ever be performed under such conditions.

The operation of oxygen detectors depends on the absolute atmospheric pressure. The concentration of natural oxygen (not manufactured or generated oxygen) is a function of the atmospheric pressure at a given altitude.

At sea level, where the weight of the atmosphere is greatest, more oxygen molecules are compressed into a given volume than at higher elevations. As elevation increases, this compression decreases, resulting in fewer oxygen molecules being "squeezed" into a given volume. Consequently, an oxygen indicator calibrated at sea level and operated at an altitude of several thousand feet will falsely indicate an oxygen-deficient atmosphere (less than 19.5 percent).

8.4.2.2 Combustible Gases/Vapors

The presence or absence of combustible vapors or gases must be evaluated at a waste site. A typical combustible gas detector determines the concentration of combustible vapors and gases present in an atmosphere. The level is recorded as a percentage of the lower explosive limit (LEL), which is measured as the change in electrical resistance in a wheatstone bridge circuit.

The LEL of a combustible gas or vapor is the lowest concentration by volume in air that will explode, ignite, or burn when there is an available ignition source. NIOSH has established the following guidelines concerning working in an explosive environment:

1. If combustible gas is detected between 10 to 25 percent LEL, work activities in the area should be limited to those that do not generate sparks.
2. If the explosivity reading on the combustible gas indicator is above 25 percent, operations will stop and the onsite area must be immediately evacuated until appropriate action can be taken to eliminate the hazard.

Once a site has been evacuated, onsite activities cannot resume until project contractor personnel have consulted with personnel experienced in fire or explosion hazards. Onsite activities around enclosed spaces and material containers should be carefully monitored for the presence of combustible gases and vapors. Around well drilling and welding operations, the air above the borehole and around the work area also needs to be monitored for combustible/explosive gases and vapors.

The combustible gas detector cannot be used to test the vapors of leaded gasoline, halogens, and sulfur compounds. These substances interfere with the filament unit, reducing the instrument's sensitivity. Compounds containing silicone will also destroy the platinum filament.

The combustible gas detector can only be used in normal atmospheres, not oxygen-enriched or -deficient. Oxygen concentrations that are less than or greater than normal may cause erroneous readings.

8.4.2.3 Organic Vapor/Gases

The initial survey of a site should always include measurements for organic vapors. Sufficient data should be obtained during the initial entry to screen the site for various levels of organic vapors. These gross measurements can be used on a preliminary basis to (1) determine levels of personnel protection, (2) establish site work zones, and (3) select candidate areas for more thorough qualitative and quantitative studies.

Organic vapor concentrations at a site can be determined by the use of a photoionization detector (PID) or a flame-ionization detector (FID).

8.4.2.3.1 Photoionization Detector

Photoionization instruments (HNU® for example) use an ultraviolet (UV) light to ionize chemical compounds. The photoionization process can be illustrated as:

$$RH + hv \quad ---> \quad RH^{+} + e-$$

where: RH is an organic or inorganic molecule and hv represents a photon of UV light.

The photon has energy equal to or greater than the molecules ionization potential and causes the emission of an electron, "e-".

The PID consists of a chamber containing a pair of electrodes. When a positive potential is applied to one electrode, the field created drives any ions formed by the absorption of UV light to the collector electrode, where the current (proportional to the concentration) is measured.

Compounds with high ionization potentials will not be detected if the lamp used does not have the sufficient energy required to ionize the compound (HNU® manufactures three UV lamps with different ionization energies).

The response to a gas or vapor may radically change when the gas or vapor is mixed with other materials. As an example, a PID calibrated to ammonia and surveying an atmosphere containing 100 ppm ammonia would indicate 100 on the meter. Likewise, an instrument calibrated to benzene would record 100 in an atmosphere containing 100 ppm benzene. However, in an atmosphere containing 100 ppm of each compound, the instrument could indicate considerably less or more than 200 ppm, depending on how it was calibrated.

8.4.2.3.2 Flame Ionization Detector

The flame ionization detector (FID) uses ionization as the detection method much the same as in the PID, except that the ionization is caused by a hydrogen flame, rather than UV light. The flame has enough energy to ionize any organic molecule with an ionization potential of 15.4 ev or less.

Inside the instrument's detection chamber, the sample is exposed to a hydrogen flame that ionizes the organic vapors. As the organic vapors burn, positively charged, carbon-containing ions are produced and collect on a negatively charged electrode. As the positive ions accumulate, a current proportional to the hydrocarbon concentration is generated on the input electrode.

Flame ionization detectors do not detect inorganic gases and vapors and many synthetic compounds. Similar to the PID, the FID responds differently to different compounds. For example, an FID that has been calibrated to methane will read 100 ppm methane in an

atmosphere containing 100 ppm methane. However, this instrument may only register 10 ppm of carbon tetrachloride in an atmosphere actually containing 100 ppm of that compound. The relative sensitivity to various compounds must be considered when using this instrument.

8.4.2.3.3 Colorimetric Indicator Tubes

Often, while evaluating a hazardous waste site, the need arises to quickly measure a specific gas. Direct-reading colorimetric indicator tubes can successfully fill that need. These tubes are usually calibrated in parts per million (ppm) or percent concentration for easy interpretation.

Colorimetric indicator tubes consist of a glass tube impregnated with an indicator chemical. A known volume of contaminated air is drawn through the tube at a predetermined rate. The contaminant reacts with the indicator chemical in the tube, producing a discoloration that is proportional to the chemical's concentration. Detector tubes are chemical specific and must be selected before leaving for the site.

Several indicator chemicals may be able to measure the concentration of a particular gas or vapor. Each chemical operates on a different chemical principle and is affected in varying degrees by temperature, air volume pulled through the tube, and interference from other gases or vapors. A "true" concentration versus the "measured" concentration may vary considerably among and between tube manufacturers.

A major limitation of this apparatus involves the process by which the operator "reads" the endpoint. The jagged edge where contaminant meets indicator chemical makes it difficult to get accurate results from this seemingly simple test. However, a diligent and experienced operator should be able to accurately read the endpoint.

8.4.2.3.4 Radiation Survey Instrument

Although radiation monitoring is usually not necessary, it should be incorporated into the initial survey where radioactive materials may potentially be present.

Normal gamma radiation background is approximately 0.01 to 0.02 mR/hr (millirem per hour) on a gamma survey instrument. Work can continue with slightly elevated radiation exposure rates; however, if the exposure rate increases to 3 to 5 times above gamma background, the Project Health and Safety Officer should be consulted. At no time should work continue with an exposure rate of 10 mR/hr or above.

The absence of gamma readings above background should not be interpreted as the complete absence of radioactivity. Radioactive materials emitting low-energy gamma, alpha, or beta radiation may be present, but for a number of reasons may not cause a response on the instrument. Unless airborne, these radioactive materials should present minimal hazard. More thorough surveys should be conducted as site operations continue, to document the absence of radioactive materials.

Radiation survey meters must only be used by persons who have been trained in the proper interpretation of their readings. The meters require frequent calibration and checking to ensure that the readings are accurate.

8.5 PERSONAL MONITORING

Selective monitoring of high risk workers (i.e., those closest to the source of contamination generation) is recommended during cleanup activities. This methodology is based on the rationale that the probability of significant exposure varies with distance from the source. If workers closest to the source of contamination are not significantly exposed, then all other workers are supposedly not exposed and do not need to be monitored.

Personal monitoring samples should be collected in the breathing zone. These samples represent the inhalation exposure of workers who are not wearing respiratory protection. "Full shift" or 8-hour air samples are analyzed in a laboratory. Full shift air samples may be collected using passive dosimeters, or by a pump that draws air onto a sorbent or filter. It is best to use pumps that maintain a constant flow rate to collect samples, because it is difficult to adjust the pump with protective equipment on.

8.6 PERIODIC MONITORING

The monitoring surveys made during the initial site entry phase are for a preliminary evaluation of atmospheric hazards. In some situations, the information obtained may be sufficient to preclude additional monitoring. However, because site activities and weather conditions change during the course of a day, a program to periodically monitor atmospheric changes must be implemented (see Table 8.1 for action levels and recommendations). At a minimum, periodic monitoring of air quality during excavation sampling will be conducted every 15 minutes.

8.7 TRAINING

It is imperative that personnel using monitoring instruments be thoroughly familiar with their use, limitations, and operating characteristics. All instruments have inherent constraints in their ability to detect and/or quantify the hazard for which they were designed. Unless trained personnel use the instruments properly and accurately assess the data readout, air hazards can be grossly misinterpreted, endangering the health and safety of field personnel.

8.8 INSTRUMENT SENSITIVITY

Although the measurement of total vapor/gas concentrations can be a useful adjunct to professional judgment in the selection of an appropriate level of protection, caution should be used in the interpretation of the readout of the measuring instrument. The response of an instrument to a gas or vapor cloud containing two or more substances does not provide the same sensitivity as measurements involving the individual, pure constituents. Hence, the instrument readout may overestimate or underestimate the concentration of an unknown composite cloud. This same type of inaccuracy could also occur in measuring a single unknown substance with the instrument calibrated to a different substance. The idiosyncrasies of each

instrument must be considered in conjunction with the other parameters in selecting the protection equipment needed. Using the total vapor/gas concentration to determine levels of protection should provide protection against concentrations greater than the readout of the instrument. However, when the upper limits of Levels C and B are approached, serious consideration should be given to selecting a higher level of protection. Cloud constituents must be identified as rapidly as possible and levels of protection based on the toxic properties of the specific substances identified.

8.9 HEAT STRESS MONITORING

Sweating does not cool the body unless moisture is removed from the body. The use of PPE reduces the body's ability to eliminate large quantities of heat because the evaporation of sweat is decreased. The body's effort to maintain an acceptable temperature may become impaired and this may cause heat stress. Increased body temperature and physical discomfort also promote irritability and a decreased attention to the performance of hazardous tasks.

Heat related problems include heat rash, fainting, heat cramps, heat exhaustion and heat stroke. Heat rash occurs because sweat isn't evaporating, making the skin wet most of the time. Standing erect and immobile in the heat allows blood to pool in the lower extremities. As a result, blood does not return to the heart to be pumped back to the brain and fainting may occur. Heat cramps are painful spasms of the muscles due to excessive salt loss from profuse sweating. Heat exhaustion occurs due to the large fluid and salt loss from profuse sweating. A person's skin is clammy and moist. Nausea, dizziness and headache may also be exhibited.

Heat stroke occurs when the body's temperature regulatory system has failed. Skin is hot, dry red, and spotted. The affected person may be mentally confused and delirious, and convulsions may occur. A person exhibiting signs of heat stroke should be removed from the work area to a shaded area immediately. The person should be soaked with water and fanned to promote evaporation. Medical attention should be obtained immediately. Early recognition and treatment of heat stroke are the only means of preventing brain damage or death.

Monitoring of personnel wearing PPE should commence when the ambient temperature is 70°F or above. Table 8.2 presents the suggested frequency for such monitoring. Monitoring frequency should increase as the ambient temperature increases or as slow recovery rates are observed. Heat stress monitoring should be performed by a person with a current first aid certification who is trained to recognize heat stress symptoms. For monitoring the body's recuperative abilities to excessive heat, one or more of the following techniques should be used. Other methods for determining heat stress monitoring, such as the wet bulb globe temperature (WBGT) index from American Conference of Governmental Industrial Hygienist (ACGIH) threshold limit value (TLV) booklet can be used.

8.9.1 Early Symptoms of Heat Related Problems:

1. Decline in task performance;
2. Incoordination;
3. Decline in alertness;

4. Unsteady walk;
5. Excessive fatigue;
6. Muscle cramps; or
7. Dizziness.

8.9.2 Susceptibility to Heat Stress Increases due to:

1. Lack of physical fitness;
2. Lack of acclimatization to the ambient temperature;
3. Increased age;
4. Dehydration;
5. Obesity;
6. Drug or alcohol use;
7. Sunburn; or
8. Infection.

To monitor the worker, measure:

- Heart rate. Count the radial pulse during a 30-second period as early as possible in the rest period;
  - If the heart rate exceeds 100 beats per minute at the beginning of the rest period, shorten the next work cycle by one-third and keep the rest period the same;
  - If the heart rate still exceeds 100 beats per minute at the next rest period, shorten the following work cycle by one-third.
- Oral temperature. Use a clinical thermometer (3 minutes under the tongue) or similar device to measure the oral temperature at the end of the work period (before drinking).
  - If oral temperature exceeds 99.6°F (37.6°C), shorten the next work cycle by one-third without changing the rest period;
  - If oral temperature still exceeds 99.6°F (37.6°C) at the beginning of the next rest period, shorten the following cycle by one-third;
  - Do not permit a worker to wear a semi-permeable or impermeable garment when oral temperature exceeds 100.6°F (38.1°C).

8.9.3 Prevention of Heat Stress

Proper training and preventive measures will aid in averting loss of worker productivity and serious illness. Heat stress prevention is particularly important because once a person suffers from heat stroke or heat exhaustion, that person may be predisposed to additional heat related illness. To avoid heat stress the following steps should be taken:

- Adjust work schedules;
  - Modify work/rest schedules according to monitoring requirements,
  - Mandate work slowdowns as needed, and
  - Perform work during cooler hours of the day, if possible, or at night if adequate lighting can be provided;
- Provide shelter (air-conditioned, if possible) or shaded areas to protect personnel during rest periods;
- Maintain worker's body fluids at normal levels. This is necessary to ensure that the cardiovascular system functions adequately. Daily fluid intake must approximately equal the amount of water lost in sweat, i.e., eight fluid ounces (0.23 liters) of water must be ingested for approximately every eight ounces (0.23 kg) of weight lost. The normal thirst mechanism is not sensitive enough to ensure that enough water will be drunk to replace lost sweat. When heavy sweating occurs, encourage the worker to drink more. The following strategies may be useful:
  - Maintain water temperature at 50°-60°F (10°-16.6°C),
  - Provide small disposable cups that hold about four ounces (0.1 liter),
  - Have workers drink 16 ounces (0.5 liters) of fluid (preferably water or dilute drinks) before beginning work, and
  - Urge workers to drink a cup or two every 15 to 20 minutes, or at each monitoring break. A total of 1 to 1.6 gallons (4 to 6 liters) of fluid per day are recommended, but more may be necessary to maintain body weight;
- Train workers to recognize the symptoms of heat-related illnesses;
- Rotate personnel and alternate job functions; and
- Avoid double shifts and/or overtime.

8.10 COLD STRESS MONITORING

Exposure to low temperatures presents a risk to employee safety and health both through the direct effect of the low temperature on the body and collateral effects such as slipping on ice, decreased dexterity and reduced dependability of equipment. All personnel must exercise increased care when working in a cold environment to prevent accidents that may result from the cold. The symptoms of cold exposure include frostbite and hypothermia. Wind increases the impact of cold on a person's body.

Frostbite is both a general and a medical term given to areas of local cold injury. Unlike systemic hypothermia, frostbite rarely occurs unless the ambient temperatures are less than freezing and usually less than 20°F. Symptoms of frostbite are: a sudden blanching or whitening of the skin; the skin has a waxy or white appearance and is firm to the touch; tissues are cold, pale, and solid. Superficial frostbite occurs when the skin is white but the underlying tissue is firm. The skin will return to shape when depressed. Deep frostbite causes the

underlying tissues to freeze. The skin will either not depress when pressed by the finger or it will depress but not return to the original contour. Deep frostbite is a serious injury.

Hypothermia is defined as a decrease in a person's core temperature below 96°F. The body temperature is normally maintained by a combination of central (brain and spinal cord) and peripheral (skin and muscle) activity. Interferences with any of these mechanisms can result in hypothermia, even in the absence of "cold" ambient temperatures. The first symptom of systemic hypothermia is shivering. Maximum shivering starts when the core body temperature drops below 95°F. The next set of symptoms as the body's cooling progresses is apathy, listlessness, and sleepiness. The person remains conscious and responsive with normal blood pressure and a core temperature of 93.2°F. The person must be immediately removed to a facility with heat. As hypothermia advances beyond this point, the person has a glassy stare, slow pulse, slow respiratory rate and may lose consciousness. Severe hypothermia starts when the core body temperature reaches 91.4°F. Finally, the extremities start to freeze hard and death could result.

8.10.1 Prevention of Cold-Related Illnesses

- Educate worker to recognize the symptoms of frostbite and hypothermia;
- Identify and limit known risk factors;
    - Prohibit phenothiazine (a sedative) use.
    - Identify/warn/limit beta blocker use.
- Assure the availability of an enclosed, heated environment on or adjacent to the site;
- Assure the availability of dry changes of clothes;
- Develop capability for temperature recording at the site; and
- Assure the availability of warm drinks.

8.10.2 Monitoring

Start (oral) temperature recording at the job site:

- At the Field Team Leader's discretion when suspicion is based on changes in worker's performance or mental status;
- At worker's request;
- As a screening measure, two times per shift, under unusually hazardous conditions (e.g., wind-chill less than 20°F, or wind-chill less than 30°F with precipitation); and
- As a screening measure whenever any one worker on the site develops hypothermia.

Any person developing moderate hypothermia (a core temperature of 92°F) cannot return to work for 48 hours.

8.11 SITE SPECIFIC RISK ANALYSIS

8.11.1 CHEMICAL HAZARDS

All intrusive activities at Site 2 property should be considered to have potentially impacted soil. The primary chemical hazards have been identified in Table 5.1. These compounds are most likely to have adverse effects if encountered in a significant quantity during field activities.

8.11.1.2 Direct Contact

Level D personal protective equipment, will be used by all personnel in areas potentially impacted by past activities. Level D equipment will require steel toed rubber boots, or boot covers that prevent contamination of steel toed boots. Nitrile outer and latex inner gloves should provide adequate protection from direct contact hazards.

8.11.1.3 Volatile Compounds (Vapor Pressure >10 mm Hg):

Of the listed volatile chemicals, benzene has the lowest PEL as set by OSHA and hence sets the action limit for monitoring with a PID. For any activities taking place in areas of potential site contaminants, continuous measurements shall be taken in the breathing zone with a PID equipped with a 10.6 eV lamp.

Background PID levels should be taken initially upwind from planned site activities. If, during site activities, PID readings reach 5 ppm above background levels (and are sustained for 15 minutes), then all personnel must upgrade to Level C personal protective gear. Upon upgrading to Level C, a Draeger, benzene 2/a color detector tube (part number 8101231) should be used to verify the absence of benzene. If benzene is greater than 5 ppm, all personnel must upgrade to Level B or retreat until air monitoring shows that concentrations have fallen below 5 ppm so that work may continue in a lower level of protection.

Furthermore, if PID readings reach 25 ppm above background (sustained for 15 minutes), then personnel should retreat and consult the Parsons Health and Safety Officer before deciding to upgrade to Level B equipment.

An upper limit of 5 ppm for PID readings for Level D work is specified in this health and safety plan. It is our experience that this upper limit will prevent over-exposures to benzene. Due to the calibration to isobutylene, the Photovac MicroTIP 2000 PID benzene response will be twice as high as the actual benzene concentrations. Thus, a pure benzene vapor of 2.5 ppm will cause the PID to read 5 ppm. Futhermore, based on experience at other sites, detectable levels of total organic vapors typically consist of other volatile constituents such as xylene, toluene and ethyl benzene in addition to benzene. The PID will detect the sum total of these volatiles.

When 5 ppm is reached on the PID response, actual benzene levels should remain below occupational limit values. To verify that this is the case, workers are to use the specified Draeger tube to check for the presence of benzene. It is our experience that Draeger tube screening with the 2/a benzene tube has not shown measurable levels of benzene in worker

breathing zones or downwind from excavations when PID readings have reached 5 ppm. The Draeger benzene 2/a tube is specified for this use as it is the only Draeger-manufactured tube which does not respond positively to the presence of ethyl benzene, toluene or xylenes vapors. The 2/a tube has a limit of detection of 2 ppm.

8.11.1.4 Semivolatile and Nonvolatile Compounds (Vapor Pressure <10 mm Hg):

Polynuclear aromatic hydrocarbons (PAHs) could pose significant health threats if ingested or inhaled as a dust. On-site personnel will avoid activities that could generate potentially contaminated dust, and work upwind of soils and groundwater during excavation activities. Should visible dust emissions occur in potentially contaminated areas, real time aerosol monitoring or upgrading to level C may be warranted for affected personnel. Consult the Parsons ES Health and Safety Officer.

The metals potentially present at Site 2 are unlikely to become airborne because of their low vapor pressures and wet conditions under which they are expected to be encountered. Due to the potential for inhalation of dust containing metals, the following formula is used to calculate the airborne dust necessary to approach the OSHA or ACGIH action levels for arsenic, beryllium, and lead. Use of the following equation determines if dust is a concern below nuisance particulate levels of approximately 5 mg/m^3. This value is the respirable dust concentration limit established by OSHA.

$$EL_{mix} = \frac{(EL_c\ mg/m^3) \times (10^6\ mg/kg)}{(\text{dust conc. } mg/kg) \times (S.F.)}$$

EL_{mix} = the exposure limit of the airborne dust containing the metal

EL_c = the action level for the metal

dust conc. = concentration of metal in dust

S.F. = Safety Factor

Maximum concentrations of each metal measured in the soils on site is presented as the dust concentration (dust conc.) expressed in milligrams per kilogram (equivalent to ppm).

For **arsenic**, $EL_c = 0.01\ mg/m^3$, dust conc. = 217 mg/kg, S.F. = 2. Therefore:

$$EL_{mix} = \frac{(0.01\ mg/m^3) \times (10^6\ mg/kg)}{(217\ mg/kg) \times (2)}$$

EL_{mix} = the exposure limit of the airborne dust containing arsenic = 23 mg/m^3

For **beryllium**, $EL_c = 0.\ 0.002\ mg/m^3$, dust conc. = 4.6 mg/kg, S.F. = 2. Therefore:

$$EL_{mix} = \frac{(0.002\ mg/m^3) \times (10^6\ mg/kg)}{(4.6\ mg/kg) \times (2)}$$

EL_{mix} = the exposure limit of the airborne dust containing antimony = 217 mg/m^3

For **lead**, EL_c = 0.05 mg/m^3 , dust conc. = 1400 mg/kg, S.F. = 2. Therefore:

$$EL_{mix} = \frac{(0.05\ mg/m^3) \times (10^6\ mg/kg)}{(1400\ mg/kg) \times (2)}$$

EL_{mix} = the exposure limit of the airborne dust containing lead = 17.8 mg/m^3

Since this EL_{mix} concentration is above the respirable nuisance particulate levels of 5 mg/m3, and above what is generally considered to be visible dust emissions, keeping dust below visible emissions will protect workers. If dust concentrations become a concern at the site perimeter, actions will be taken to wet down soils to control fugitive dust. These measures will include wetting down the soil with water spray, covering soil piles with plastic sheeting, or other methods to effectively reduce dust levels.

8.11.2 SUMMARY OF WORK AREA ACTION LEVELS

Based on a review of the potential chemical hazards at the site, the following conditions will determine the level of protective equipment that will be used by personnel while on-site:

Conditions for Level D: - All areas

- PID readings < 5 ppm.

Conditions for Level C: - All areas

- PID readings > 5 ppm and < 25 ppm

and · Draeger, benzene 2/a tube readings < 2 ppm

or · Any visible fugitive dust emissions from site activities that disturb contaminated soil.

Conditions for Level B (or retreat): - All areas

- PID readings > 25 ppm.

or · Draeger, Benzene 2/a Tube readings > 2 ppm

8.12 Community Air Monitoring Plan

Real-time air monitoring for volatile organic compounds and aerosols at the perimeter of the site is necessary.

- Volatile organic compounds must be monitored at the downwind perimeter of the exclusion zone daily at 2 hour intervals. If total organic vapor levels exceed 1 ppm

above background, excavation activities must be halted and monitoring continued under the provisions of the Vapor Emission Response Plan (see below). All readings must be recorded and be available for State personnel to review.

- Particulates shall be continuously monitored downwind of the exclusion zone with a portable particulate monitor that would have an alarm set at 150 $\mu g/m^3$. If downwind particulate levels, integrated over a period of 15 minutes, exceed 150 $\mu g/m^3$, then particulate levels upwind of the survey or work site would be measured. If the downwind particulate level is more than 100 $\mu g/m^3$ greater than the upwind particulate level, then excavation activities must be stopped and corrective action taken. All readings must be recorded and be available for State personnel to review.

8.12.1 Vapor Emission Response Plan

If the ambient air concentration of organic vapors exceeds 5 ppm above background at the perimeter of the Exclusion Zone, excavation activities will be halted and monitoring continued. If the organic vapor level decreases below 5 ppm above background, excavation activities can resume. If the organic vapor levels are greater than 5 ppm over background but less than 25 ppm over background at the perimeter of the Exclusion Zone, activities can resume provided:

- the organic vapor level 200 ft. downwind of the Exclusion Zone or half the distance to the nearest residential or commercial structure, whichever is less, is below 1 ppm over background, and
- more frequent intervals of monitoring, as directed by the Site Health and Safety Officer, are conducted.

If the organic vapor level is above 25 ppm at the perimeter of the Exclusion Zone work activities must be shutdown. When work shutdown occurs, downwind air monitoring as directed by the Safety Officer will be implemented to ensure that vapor emission does not impact the nearest residential or commercial structure at levels exceeding those specified in the Major Vapor Emission section.

8.12.2 Major Vapor Emission

If any organic levels greater than 5 ppm over background are identified 200 feet downwind from the Survey Site or half the distance to the nearest residential or commercial property, whichever is less, all work activities must be halted.

If, following the cessation of the work activities, or as the result of an emergency, organic levels persist above 5 ppm above background 200 feet downwind or half the distance to the nearest residential or commercial property from the Exclusion Zone, then the air quality must be monitored within 20 feet of the perimeter of the nearest residential or commercial structure (20 Foot Zone).

If either of the following criteria are exceeded in the 20 Foot Zone, then the Major Vapor Emission Response Plan shall automatically be implemented:

- Organic vapor levels approaching 5 ppm above background for a period of more than 30 minutes.
- Organic vapor levels greater than 10 ppm above background for any time period.

8.12.3 Major Vapor Emission Response Plan

Upon activation, the following activities will be undertaken:

1. The local police authorities will immediately be contacted by the Safety Officer and advised of the situation;
2. Frequent air monitoring will be conducted at 30 minute intervals within the 20 Foot Zone. If two successive readings below action levels are measured, air monitoring may be halted or modified by the Safety Officer; and
3. All Emergency contacts will go into effect as appropriate.

TABLE 8.1

ATMOSPHERIC HAZARD GUIDELINES

Monitoring Equipment	Hazard	Ambient Level	Action
Combustible gas indicator	Explosive atmosphere	<10% LEL	Continue investigation.
		10% to 25%	Continue onsite monitoring with extreme caution as higher levels are encountered.
		>25% LEL	Explosion hazard; withdraw from are immediately.
Oxygen concen-ration meter	Oxygen	<19.5%	Monitor, wearing self-contained breathing apparatus (SCBA). Note: Combustible gas readings are not valid in atmospheres with < 19.5% oxygen.
		19.5% to 21%	Continue investigation with caution. SCBA not needed, based on oxygen content only.
		>25%	Discontinue inspection; fire hazard potential.
Radiation	Radiation	<1 mR/hr	Continue investigation. If radiation is detected above background levels, this signifies the presence of possible radiation sources; at this level, more thorough monitoring is advisable. Consult with the Project Health and Safety Officer.
		>10 mR/hr	Potential radiation hazard; evacuate site.
Colorimetric tubes	Organic and inorganic vapors/ gases	Depends on species	Consult standard reference manuals for air concentrations/ toxicity data.

TABLE 8.1 (Continued)

ATMOSPHERIC HAZARD GUIDELINES

Monitoring Equipment	Hazard	Ambient Level	Action
Photoionization Detector	Organic vapors/ gases	Depends on species	Consult standard reference manuals for air concentrations/toxicity data.
		Total response mode	Consult Parsons ES Guidelines for the selection of appropriate level of protection.
Flame Ionization Detector	Organic	Depends on species	Consult standard reference manuals for air concentrations/ toxicity data.
		Total response mode.	Consult Parsons ES Guidelines for the selection of appropriate level of protection.

TABLE 8.2

SUGGESTED FREQUENTY OF PHYSIOLOGICAL MONITORING
FOR FIT AND ACCLIMATED WORKERS [a]

Adjusted Temperature [b]	Normal Work Ensemble [c]	Impermeable Ensemble
90°F or above	After each 45 minutes of work	After each 15 minutes of work
87.5-90°F (30.8-32.3°C)	After each 60 minutes of work	After each 30 minutes of work
82.5-87.5°F (28.1-30.8°C)	After each 90 minutes of work	After each 60 minutes of work
77.5-82.5°F (25.3-28.1°C)	After each 120 minutes of work	After each 90 minutes of work
72.5-77.5°F (22.5-25.3°C)	After each 150 minutes of work	After each 120 minutes of work

[a] For work levels of 250 kilocalories/hour

[b] Calculate the adjusted air temperature (ta adj) by using this equation:

TA ADJ °F = TA °F + (13 x % Sunshine).

Measure air temperature (ta) with a standard mercury-in-glass thermometer, with the bulb shielded from radiant heat. Estimate percent sunshine by judging what percent time the sun is not covered by clouds that are thick enough to produce a shadow.

(100 percent sunshine = no cloud cover and a sharp, distinct shadow; 0 percent sunshine = no shadows.)

[c] A normal work ensemble consists of cotton coveralls or other cotton clothing with long sleeves and pants.

SECTION 9

SITE PREPARATION, ZONES, AND SECURITY

9.1 PURPOSE

OSHA requires (29 CFR Part 1910.120[d]) that a site control program be developed before the initiation of hazardous waste operations. The purpose of this guideline is to establish site control principles that will minimize potential contamination for contractor personnel and protect the public from the site's hazards.

9.2 GUIDELINE

The activities required during hazardous waste operations involve the movement of materials (contaminants) from the site to unaffected areas. Contractor personnel and equipment may become contaminated and carry the materials into clean areas. Contaminants may become airborne because of their volatility, or the disturbance of contaminated soil may cause it to become wind blown. Contamination control procedures are needed and will reduce the transfer of hazardous substances from the site.

Several site control procedures can be implemented to reduce worker and public exposure to chemical, biologic, physical, and safety hazards:

- Compile a site map;
- Establish work zones;
- Use the buddy system when necessary;
- Establish and strictly enforce decontamination procedures for both personnel and equipment (see Section 10);
- Establish site security measures as needed;
- Set up communication networks;
- Enforce safe work practices;
- When contaminants other than those previously identified are handled;
- When different operations are begun;
- When employees are handling leaking drums or working with obvious liquid contamination; and
- When weather conditions change.

Field operations are to be conducted with a minimum of two persons on site. For operations requiring Level B personal protective equipment a minimum of three people will be required.

9.3 SITE WORK ZONES

One method of preventing or reducing the migration of contamination is to delineate zones on the site where prescribed operations occur. Movement of personnel and equipment between zones and onto the site itself would be limited by access control points. By these means, contamination would be expected to be contained within certain relatively small areas on the site and its potential for spread minimized. Three contiguous zones (Figure 9.1) are recommended.

9.3.1 Exclusion Zone

The Exclusion Zone is an area where contamination does or could occur. Major activities that are performed in the Exclusion Zone include:

- Site characterization, such as mapping, photographing, and sampling;
- Installation of wells for groundwater monitoring; and
- Cleanup work, such as drum movement, drum staging, and materials bulking.

Everyone entering the Exclusion Zone must wear prescribed levels of protection. An entry and exit check point must be established at the periphery of the Exclusion Zone to regulate the flow of contractor personnel and equipment in and out of the zone and to verify that the procedures established to exit and enter are followed.

The outer boundary of the Exclusion Zone, the Hotline, is initially established by visually surveying the immediate environs of the incident and determining where the hazardous substances involved are located; where any drainage, leachate, or spilled material is; and whether any discolorations are visible. Guidance in determining the boundaries is also provided by data from the initial site survey indicating the presence of organic or inorganic vapors/gases or particulates in air, combustible gases, and radiation, or the results of water and soil sampling.

Additional factors that should be considered include the distances needed to prevent fire or an explosion from affecting contractor personnel outside the zone, the physical area necessary to conduct site operations, and the potential for contaminants to be blown from the area. Once the Hotline has been determined, it should be physically secured, fenced, or well-defined by landmarks. During subsequent site operations, the boundary may be modified and adjusted as more information becomes available.

9.3.2 Contamination Reduction Zone

The Contamination Reduction Zone (CRZ) is located between the contaminated area and clean area. This zone is designed to reduce the probability that the clean Support Zone will become contaminated and/or affected by other hazards on site. The distance between the Exclusion Zone and Support Zone provided by the CRZ, together with decontamination of workers and equipment, limits the physical transfer of hazardous chemicals into clean areas. The degree of contamination in the CRZ decreases as one moves from the Exclusion Zone to Support Zone because of the distance and the decontamination procedures.

The boundary between the Support Zone and the CRZ, the Contamination Control Line, separates the possibly low contamination area from the clean Support Zone. Access to the CRZ from the Support Zone is through a control point. Contractor personnel entering through the control point must wear the prescribed PPE, for working in the CRZ. Entering the Support Zone requires removal of any protective equipment worn in the CRZ.

9.3.3 Support Zone

The Support Zone, the outermost part of the site, is considered noncontaminated or clean area. The Support Zone is the location of the administrative and other support functions necessary to maintain smooth operations in the Exclusion Zone and CRZ. Contractor personnel may wear normal work clothes in this area. Any potentially contaminated equipment or clothing must be decontaminated before entry into this area.

The location of the Support Zone depends on a number of factors including:

- Accessibility: topography; open space available; locations of highways, railroad tracks; or other limitations;
- Wind direction: preferably the support facilities should be located upwind of the Exclusion Zone. However, shifts in wind direction and other conditions may be such that an ideal location based on wind direction along does not exist;
- Resources: adequate roads, power lines, water, and shelter.

9.4 SITE SECURITY

Site security at a hazardous waste site is necessary to:

- Prevent the exposure of unauthorized, unprotected people to the site hazards;
- Prevent theft;
- Avoid interference with safe working procedures.

During the work day, site security can consist of:

- Assign responsibility for enforcing authority for entry and exit requirements;
- Maintain security in the Support Zone and at Access Control Points;
- If the site is not fenced, post signs around the perimeter;
- Have the Field Team Leader approve all visitors to the site. Make sure they have a valid purpose for entering the site. Have trained site personnel accompany visitors at all times.

During off-duty hours, site security can consist of:

- If needed, use security guards to patrol the site boundary. Guards must be fully apprised of the hazards at the site; and

- Secure the equipment.

9.5 SITE COMMUNICATION

Two communication systems should be established during hazardous waste operations; an internal communication among contractor personnel on site, and an external communication between onsite and off-site contractor personnel.

Internal communication at site is used to:

- Alert personnel to emergencies;
- Convey safety information (e.g., amount of time left in air tanks, heat stress check, etc.);
- Communicate changes in the work to be performed; and
- Maintain site control.

Often at a site, communications can be impeded by background noise and the use of PPE. For communications to be effective, commands must be prearranged. In addition, audio or visual cues can aid in conveying the message. Some common internal communication devices are: two-way radios, noisemakers (e.g., bells, whistles, compressed air horns, etc.), and visual signals (e.g., flags, hand signals, and lights). Radios used in the Exclusion Zone must be intrinsically safe and not capable of sparking.

An external communication system between onsite and off-site contractor personnel is necessary to:

- Report to management;
- Coordinate emergency response; and
- Maintain contact with essential off-site contractor personnel.

The primary means of external communication is the telephone. If a telephone is not present at the site, all team members must know where the nearest phone is located. The correct change and necessary phone number should be readily available.

9.6 SAFE WORK PRACTICES

To ensure a strong safety awareness during hazardous waste operations, a list of standing orders stating the practices that may never occur in contaminated areas should be developed. Sample standing orders for contractor personnel entering an Exclusion Zone may include:

- No smoking, eating, drinking, or application of cosmetics in this zone;
- No matches or lighters in this zone;
- Check in at the entrance Access Control Point before you enter this zone;
- Check out at the exit Access Control Point before you leave this zone;

- Always have your buddy with you in this zone;
- Wear an air purifying respirator in this zone; and
- If you discover any signs of radioactivity, explosivity, or unusual conditions such as dead animals at the site, exit immediately and report this finding to your supervisor.

Standing orders should be posted conspicuously at the site.

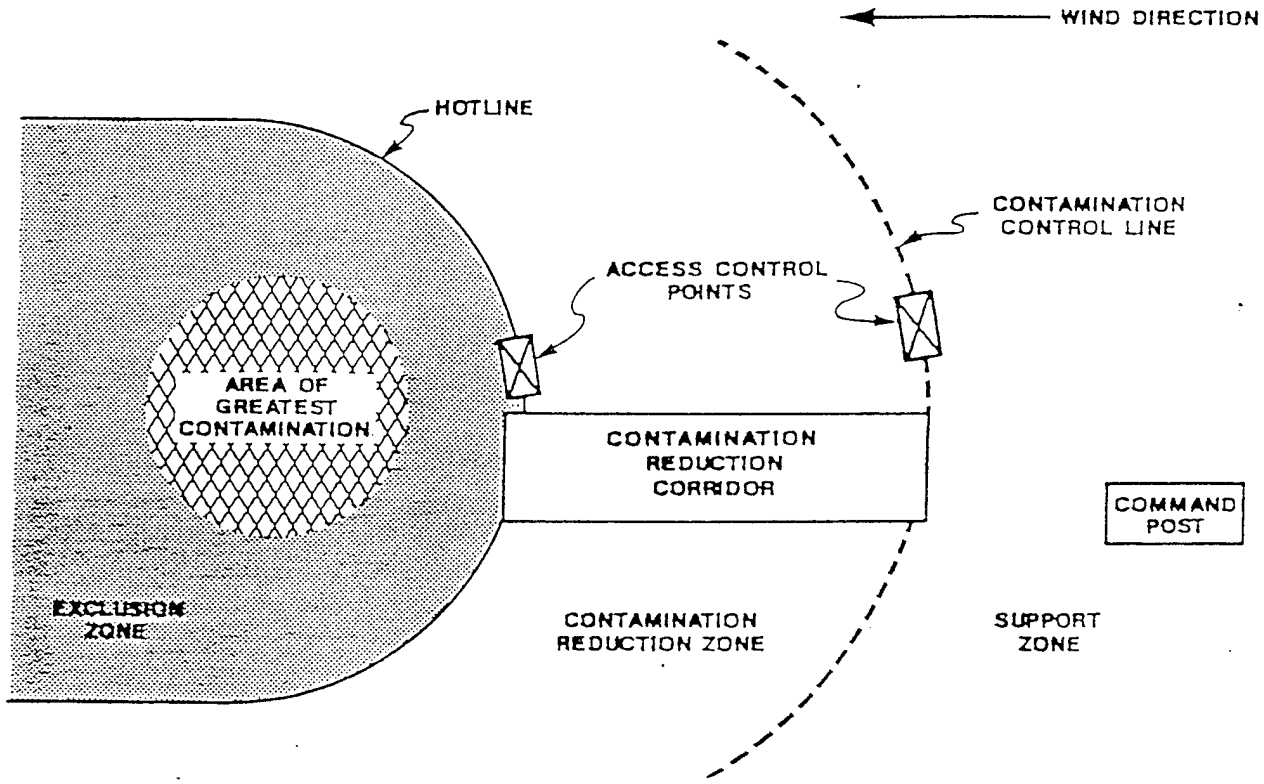
In addition to standing orders, contractor personnel should be briefed on the chemical information of the site contaminant at the beginning of the project. Daily site safety meetings should be held for field team members and any other site contractor personnel.

Working with tools and heavy equipment is a major hazard at sites. Injuries can result from equipment hitting personnel, impacts from flying objects, burns from hot objectives, and damage to protective equipment such as supplied-air respirator systems. The following precautions will help prevent injuries because of such hazards:

- Keep all heavy equipment that is used in the Exclusion Zone in that zone until the job is done. Completely decontaminate such equipment before moving it into the clean zone;
- Train personnel in proper operating procedures;
- Install appropriate equipment guards and engineering controls on tools and equipment;
- Where portable electric tools and appliances can be used (i.e., where there is no potential for flammable or explosive conditions), use three-wire grounded extension cords to prevent electric shocks;
- Keep all non-essential people out of the work area;
- Prohibit loose-fitting clothing around moving machinery;
- Do not exceed the rated load capacity of a vehicle; and
- Do not operate cranes or derricks within 10 feet of power lines.

FIGURE 9.1

DIAGRAM OF SITE WORK ZONES



SECTION 10

DECONTAMINATION PROCEDURES

10.1 PURPOSE

To establish fundamental decontamination principles to be used as a guide on developing site and activity specific decontamination procedures.

10.2 GUIDELINE

Contractor personnel responding to hazardous substance incidents may become contaminated during the course of their work at a site. Protective clothing and respirators help to prevent the wearer from becoming contaminated or inhaling contaminants. Good work practices help reduce the contamination of protective clothing, instruments, and equipment. Even with these safeguards, contamination may occur. Harmful materials can be transferred into clean areas, exposing unprotected personnel. In removing contaminated clothing, personnel may come into direct contact with and/or inhale contaminants. To prevent such occurrences, contamination reduction and decontamination procedures must be developed and implemented. Such procedures are to be in place before anyone enters a hazardous area and must continue (modified if necessary) throughout the period of operation.

Decontamination consists of physically removing contaminants and/or converting them chemically into innocuous substances. The extent of decontamination depends on a number of factors, the most important being the type of contaminants involved. The more harmful the contaminant, the more extensive and thorough the decontamination required. Combining decontamination, the correct donning of protective equipment, and the zoning of site work areas minimizes the possibility of cross-contamination from protective clothing to wearer, or from equipment to workers. Only general guidance can be given on methods and techniques for decontamination. The exact procedure is determined by evaluating several factors specific to the site.

10.3 INITIAL PLANNING

The initial decontamination plan is based on the assumption that all contractor personnel and equipment leaving the Exclusion Zone (area of potential contamination) are grossly contaminated. The plan includes a system for washing and rinsing, at least once, all of the protective equipment worn. The washing and rinsing are done in combination with a sequential doffing of clothing, starting at the first station with the most heavily contaminated article and progressing to the last station with the least contaminated article.

10.4 CONTAMINATION AVOIDANCE

Contamination avoidance is the best method for preventing the spread of contamination from a hazardous waste site. While planning site operations, methods are to be developed to

prevent the contamination of personnel and equipment. Each person involved in site operations must regularly practice the basic methods of site contamination avoidance listed below.

- Know the limitations of all protective equipment being used;
- Do not enter a contaminated area unless it is necessary to carry out a specific objective;
- Avoid touching anything unnecessarily when in a contaminated area;
- Walk around pools of liquids, discolored areas, or any area that shows evidence of possible contamination;
- Walk upwind of contamination, if possible;
- Do not sit or lean against anything in a contaminated area. If you have to kneel (e.g., to take samples), use a plastic ground sheet;
- Before sampling any hazardous waste, read the label and manifest (if available) for all containers to determine the identity of the substance to be sampled and the potential contamination hazard;
- Check for potential incompatibility of wastes while checking for waste contents. These conditions might be caused by heat, fire, or gas; an explosion; the contact of water and alkali metals; violent polymerization; or solubilization of toxic substances. Check waste containers for evidence of these conditions such as bulged drums, blistered paint, exploded drums, bubbles, dead vegetation, or melted plastic;
- Avoid setting sampling equipment directly on contaminated areas. Place equipment on a protective cover such as a ground cloth; and
- Use the proper tools necessary to safely conduct the study.

Where possible, plan very specific methods to reduce the risk of contamination. Using remote sampling techniques, opening containers by non-manual means, bagging monitoring instruments, using drum grapplers, watering down dusty areas, and avoiding areas of obvious contamination reduces the possibility of contamination and precludes elaborate decontamination procedures.

10.5 SITE ORGANIZATION

An area within the CRZ (Figure 10.1) is designated the Contamination Reduction Corridor (CRC). The CRC controls access into and out of the Exclusion Zone and confines personnel decontamination activities to a limited area. The size of the corridor depends on the number of stations in the decontamination procedure, the overall dimension of work controls zones, and the amount of space available at the site. A corridor of 75 feet by 15 feet should be adequate for full decontamination. Whenever possible, it should be a straight path. The CRC boundaries should be conspicuously marked, with entry and exit restricted. The boundary between the Exclusion Zone and the CRZ is referred to as the hotline. Contractor personnel exiting the Exclusion Zone must go through the CRC. Anyone in the CRC should be wearing the level of protection designated for the decontamination crew. Within the CRC, distinct areas are set aside for decontamination of personnel, portable field equipment, and clothing. These areas

must be marked and restricted to those workers wearing the appropriate protection. All activities within the corridor are confined to decontamination. The level of decontamination must be spelled out in the project health and safety plan.

Protective clothing, respirators, monitoring equipment, sampling supplies, and other equipment are all maintained in a support area outside of the CRC. Contractor personnel don their protective equipment (dressout) away from the CRC and enter the Exclusion Zone through a separate access control point at the hotline.

10.6 DECONTAMINATION GUIDANCE

The protection selected for an investigation and the specific pieces of clothing worn in the exclusion zone dictate the items required and layout of the decontamination line. Different degrees of protection present a different situation with respect to the type of decontamination procedure required. Figures 10.2, 10.3, 10.4, 10.5, and 10.6 outline the decontamination line organization for standard levels of protection. Level C and D protection and decontamination procedures are anticipated for Site 2.

The reason for leaving the Exclusion Zone determines the need for and extent of decontamination. Also, the time required for worker decontamination must be determined and incorporated in the scheduling of site activities. A worker leaving the Exclusion Zone to pick up or drop off tools or instruments and immediately returning may not require full decontamination. A worker leaving to get a new air cylinder or change a respirator or canisters, however, would require some degree of decontamination. Contractor personnel wearing self-contained breathing apparatuses must leave their work areas with sufficient air to walk to the CRC and go through decontamination. Contractor personnel departing the CRC at breaktime, lunchtime, or the end of the day must be thoroughly decontaminated.

The type of decontamination equipment, materials, and supplies are generally selected on the basis of availability. The ease of equipment decontamination and disposability are also considered. Most equipment and supplies are easily procured. Soft-bristle scrub brushes or long-handle brushes are used to remove contaminants. Buckets of water or garden sprayers are used for rinsing. Large galvanized wash tubs, stock tanks, or children's wading pools can be used as containers for wash and rinse solutions. Large plastic garbage cans or containers lined with plastic bags are useful for the storage of contaminated clothing and equipment, and metal or plastic cans or drums are useful for the storage of contaminated liquids. Other gear includes paper or cloth towels for drying protective clothing and equipment.

Heavy equipment such as bulldozers, trucks, backhoes, and drilling equipment are difficult to decontaminate. The method generally used is to wash them with water under high pressure and scrub accessible parts with detergent/water solution, also under pressure if possible. Particular attention should be given to tires, scoops, and other components that directly contact contaminated areas. Provisions should be made to collect rinsate for treatment or disposal.

Protective equipment is usually decontaminated by scrubbing with detergent water using a soft-bristle brush followed by rinsing with copious amounts of water. While this process may

not be fully effective in removing some contaminants (in some instances the contaminants may react with water), it is a relatively safe option compared to the use of a decontaminating solution. The contaminant must be identified before a decontamination chemical is used, and reactions of such a chemical with unidentified substances or mixtures could be especially troublesome.

Sampling devices and tools may required special cleaning depending on the specific contaminants found at the site. General decontamination procedures should typically be followed.

10.7 EXTENT OF DECONTAMINATION REQUIRED

The project health and safety plan must be adapted to specific conditions. These conditions may require more or less personnel decontamination than was incorporated into the initial plan, depending on the following factors:

- Type of contaminant. The extent of personnel decontamination depends on the effects the contaminants have on the body. Whenever it is known or suspected that personnel can come in contact with highly toxic or skin-destructive substances, full decontamination procedures should be followed. If less hazardous materials are involved, the procedure can be downgraded;
- Amount of contamination. The amount of contamination on the protective clothing is usually determined visually. If the clothing is badly contaminated, a thorough decontamination is generally required. Gross materials remaining on the protective clothing for any extended period of time may degrade or permeate it. This likelihood increases with higher air concentrations and greater amounts of liquid contamination. Gross contamination also increases the probability of personnel contact;
- Level of protection. The level of protection and specific pieces of clothing worn determine, on a preliminary basis, the layout of the decontamination line. Each level of protection incorporates different problems in decontamination such as the harness straps and backpack assembly of the self-contained breathing apparatus. A butyl rubber apron worn over the harness makes decontamination easier. Clothing variations and different levels of protection may require adding or deleting stations in the original decontamination procedure;
- Work function. The work each person does determines the potential for contact with hazardous materials. In turn, this dictates the layout of the decontamination line. For example, observers, photographers, operators of air samplers, or others in the Exclusion Zone performing tasks that will not bring them in contact with contaminants may not need to have their garments washed and rinsed. Others in the Exclusion Zone with a potential for direct contact with the hazardous material will require a more thorough decontamination. Different decontamination lines could be set up for different job functions, or certain stations in a line could be omitted for personnel performing certain tasks; and

- Location of contamination. Contamination on the upper areas of the protective clothing poses a greater risk to the worker because volatile compounds may generate a hazardous breathing concentration both for the worker and for the decontamination personnel. There is also an increased probability of contact with skin when removing clothing from the upper body.

10.8 TESTING THE EFFECTIVENESS OF DECONTAMINATION

Decontamination methods vary in their effectiveness for removing chemicals. The decontamination method chosen for a site should be assessed at the beginning of the program and periodically throughout the program by the Project Health and Safety Manager. If contaminants are not being removed or are permeating protective clothing, the decontamination program should be changed. The following methods may be useful in assessing the effectiveness of decontamination:

- Natural light. Discolorations, stains, corrosive effects, visible dirt, or alterations in clothing fabric may indicate that contaminants have not been removed. Not all contaminants leave visible traces; many contaminants can permeate clothing and are not easily observed;
- Ultraviolet light. Certain contaminants, such as polycyclic aromatic hydrocarbons, which are common in many refined oils and solvent wastes, fluoresce and can be visually detected when exposed to ultraviolet light. Ultraviolet light can be used to observe contamination of skin, clothing, and equipment. However, the use of ultraviolet light can increase the risk of skin cancer and eye damage; therefore, a qualified health professional should assess the benefits and risks associated with ultraviolet light before its use at a waste site;
- Photoionization detector. A photoionization detector can be used to determine the effectiveness of the decontamination procedure in removing many volatile organic compound. However, this method would be ineffective in determining the extent of residual pesticides or metal on personal protective equipment because these substances are not volatile; and
- Wipe testing. This method provides after-the-fact information on the effectiveness of decontamination. In this procedure, a dry or wet cloth, glass fiber filter paper, or swab is wiped over the surface of a contaminated object and then analyzed in a laboratory. Both the inner and outer surfaces of protective clothing should be tested. Skin may also be tested using wipe samples.

10.9 DECONTAMINATION DURING MEDICAL EMERGENCIES

The project health and safety plan should establish methods for decontaminating personnel with medical problems and injuries. It is possible that decontamination may aggravate or cause more serious health effects. If prompt life-saving first aid and medical treatment is required, decontamination procedures should be omitted. Whenever possible, response personnel should accompany contaminated victims to the medical facility to advise on matters involving decontamination.

10.9.1 Physical Injury

Physical injuries can range from a sprained ankle to a compound fracture, from a minor cut to massive bleeding. Depending on the seriousness of the injury, treatment may be given at the site by trained response personnel. For more serious injuries, additional assistance may be required at the site or the victim may have to be transported to a medical facility.

Life-saving care should be started immediately, without considering decontamination. The outside garments can be removed if they do not cause delays, interfere with treatment, or aggravate the problem. Respirators and backpack assemblies must always be removed. Fully encapsulating suits or chemical-resistant clothing can be cut away. If the outer contaminated garments cannot be safely removed, the individual should be wrapped in plastic, rubber, or blankets to help prevent contaminating medical personnel and the inside of ambulances. Outside garments are then removed at the medical facility. No attempt should be made to wash or rinse the victim at the site. One exception would be if it is known that the individual has been contaminated with an extremely toxic or corrosive material that could also cause severe injury or loss of life. For minor medical problems or injuries, the normal decontamination procedure should be followed.

10.9.2 Heat Stress

Heat-related illnesses range from mild heat fatigue to a serious heat stroke. Heat stroke requires prompt treatment to prevent irreversible damage or death. Unless the victim is obviously contaminated, decontamination should be omitted or minimized and treatment begun immediately. Protective clothing may have to be cut off. Less serious stages of heat stress require prompt attention because they can lead to heat stroke.

10.9.3 Chemical Exposure

Exposure to chemicals can be divided into two categories:

1. Injuries from direct contact, such as acid burns or inhalation of toxic chemicals;
2. Potential injury caused by gross contamination on clothing or equipment.

For inhaled contaminants, treatment can only be performed by qualified physicians. If the contaminant is on the skin or in the eyes, immediate measures must be taken to counteract the substance's effect. First aid treatment generally includes flooding the affected area with water. For a few chemicals, water may cause more severe problems.

When protective clothing is grossly contaminated, contaminants may be transferred to treatment personnel or the wearer and cause injuries. Unless severe medical problems have occurred simultaneously with splashes, the protective clothing should be washed off as rapidly as possible and carefully removed.

10.10 CLOSURE OF THE CRC

When the CRC is no longer needed, it must be closed down by the operators. All disposable clothing and plastic sheeting used during the operation must be double-bagged and

either contained on site or removed to an approved off-site disposal facility. Decontamination and rinse solutions should be discarded on site if approved by regulatory agencies or it must be removed to an approved disposal facility. Reusable rubber clothing should be dried and prepared for future use (if gross contamination had occurred, additional decontamination of these items may be required). Cloth items must be bagged and removed from the site for final cleaning. Commercial laundries or cleaning establishments that decontaminate protective clothing or equipment shall be informed of the potentially harmful effects of exposures to hazardous substances. All wash tubs, pails, containers, etc., must be thoroughly washed, rinsed, and dried before removal from the site.

10.11 NECESSARY EQUIPMENT

Based on the expected levels and types of contaminants at the site, modifications to the OSHA-specified modifications, the equipment listed below may be necessary for personnel decontamination.

10.12 EQUIPMENT DECONTAMINATION

Sampling equipment such as split spoon samplers, probes, and stainless steel bowls and spoons will be decontaminated before each use and at the end of the day. Decontamination procedures include:

- Rinse with potable water;
- Wash with phosphate-free detergent;
- Rinse with potable water;
- Rinse with technical grade methanol;
- Rinse with deionized water; and
- Allow to air dry.

10.13 EXCAVATOR DECONTAMINATION

The excavator will be steam-cleaned and sampling equipment will be decontaminated prior to moving offsite. The equipment will be decontaminated in the following manner:

- The excavator will be steam cleaned to remove gross contamination; and
- Equipment will be air-dried.

All sampling equipment will be decontaminated prior to use at each sampling location. The sampling equipment will be decontaminated in the following manner:

- The sampling spoon and bowl will be washed with Alconox, rinsed with methanol, and rinsed with deionized water.

FIGURE 10.1

CONTAMINATION REDUCTION ZONE LAYOUT

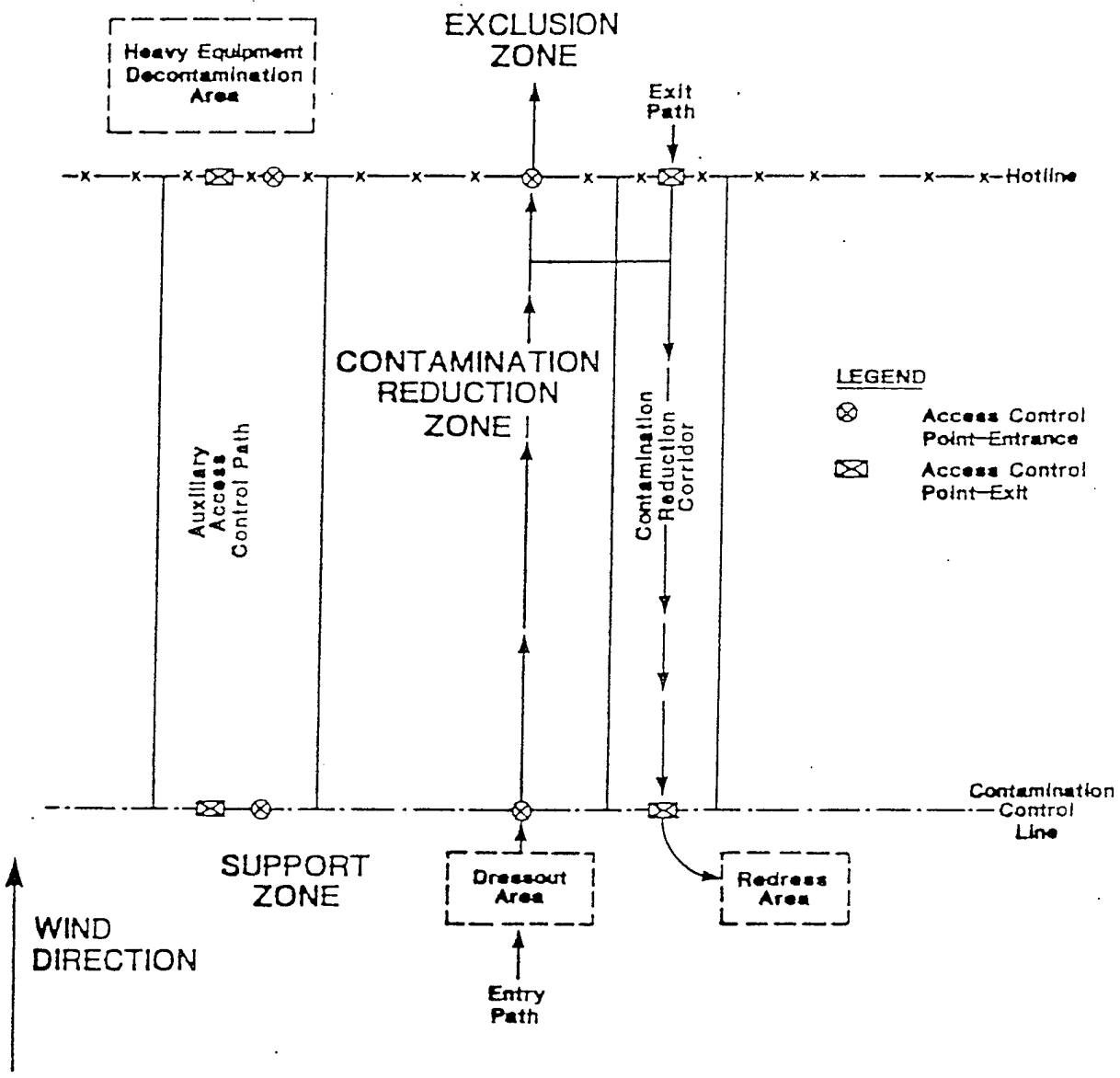
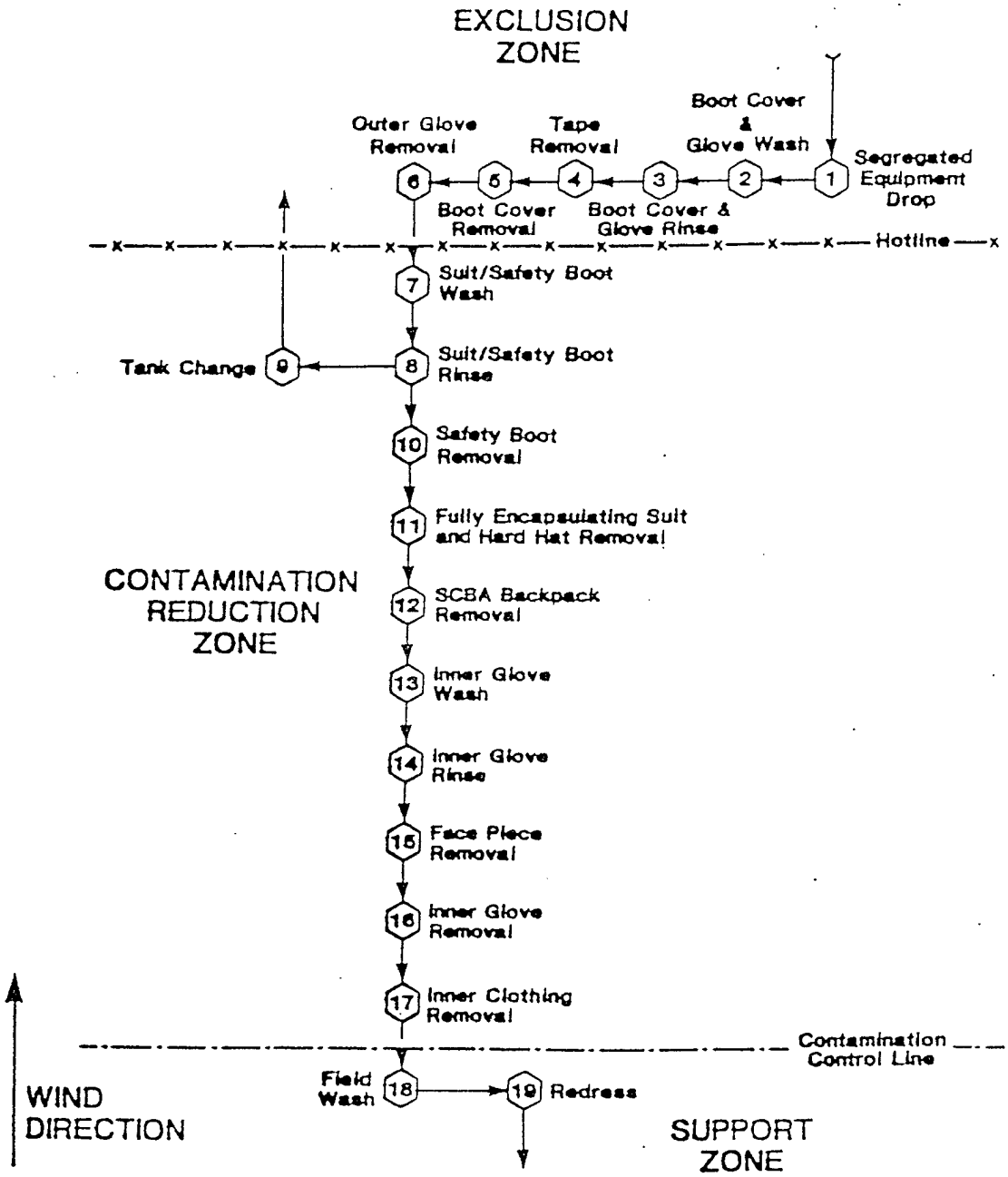


FIGURE 10.2

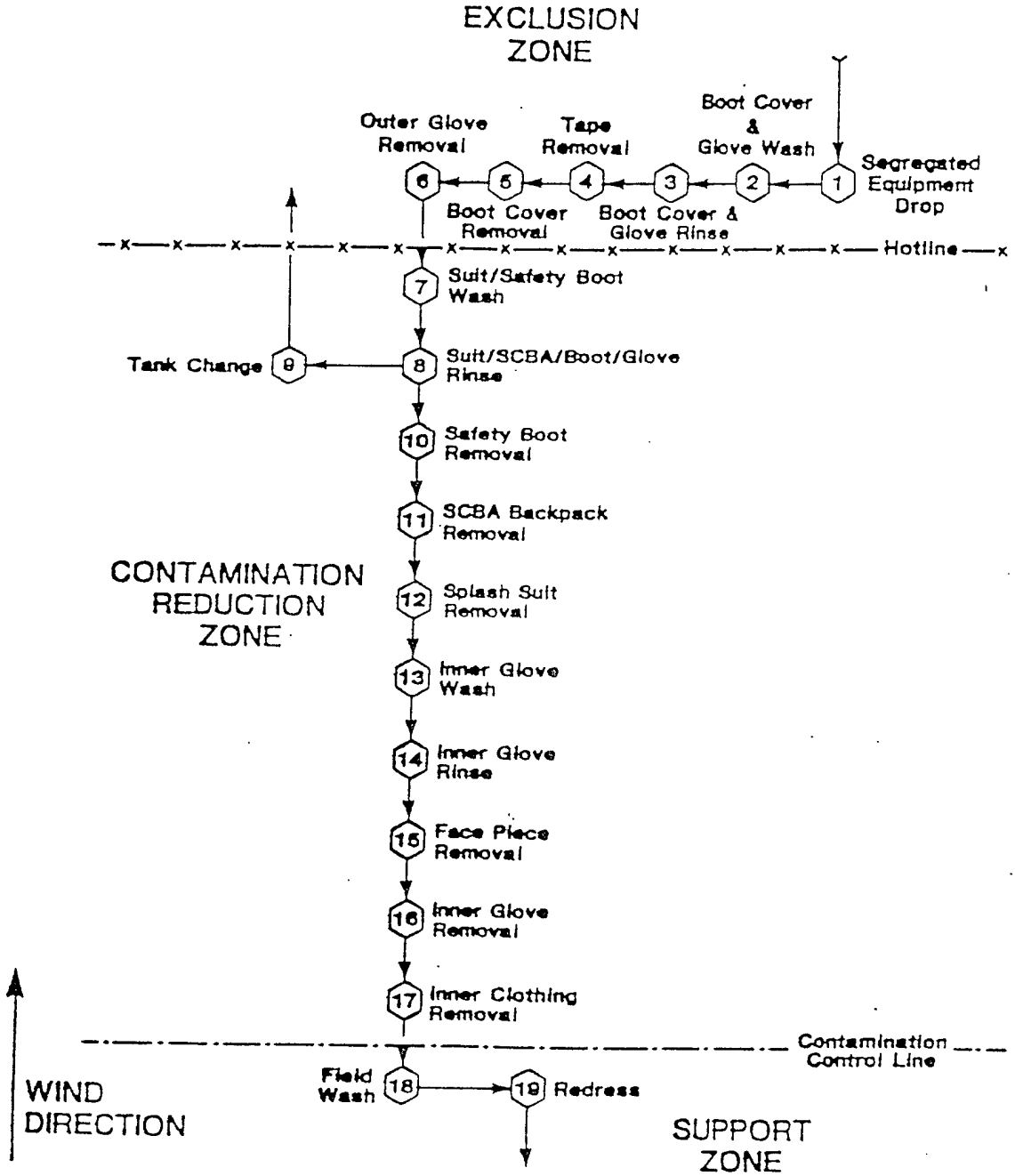
COMPLETE DECONTAMINATION LAYOUT FOR LEVEL A PROTECTION



SOURCE: USEPA 1983. Material Hazards Incidents Training Manual.

FIGURE 10.3

COMPLETE DECONTAMINATION LAYOUT FOR LEVEL B PROTECTION



SOURCE: USEPA 1983. Material Hazards Incidents Training Manual.

FIGURE 10.4

MINIMUM DECONTAMINATION LAYOUT FOR LEVELS A AND B PROTECTION

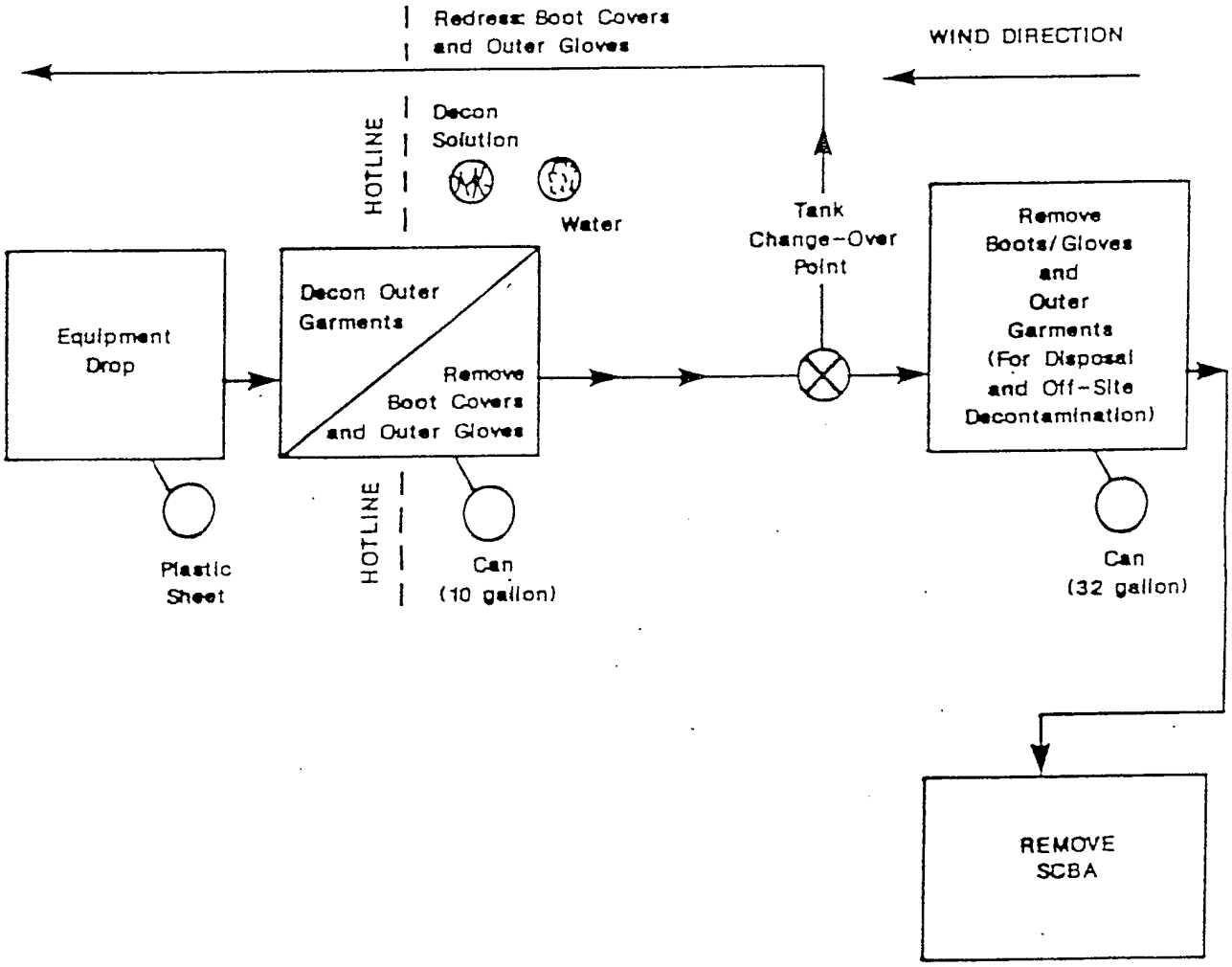
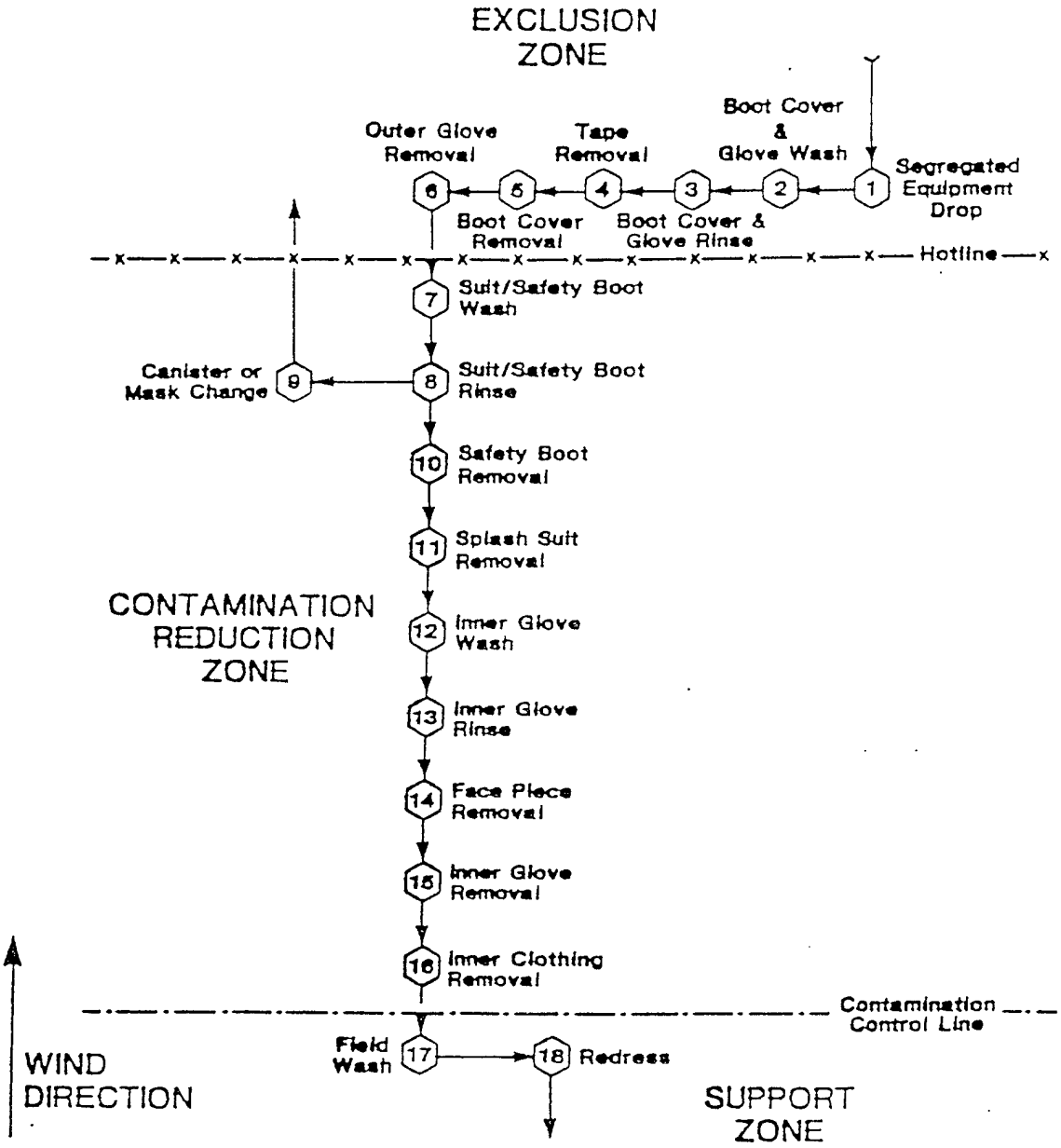


FIGURE 10.5 –

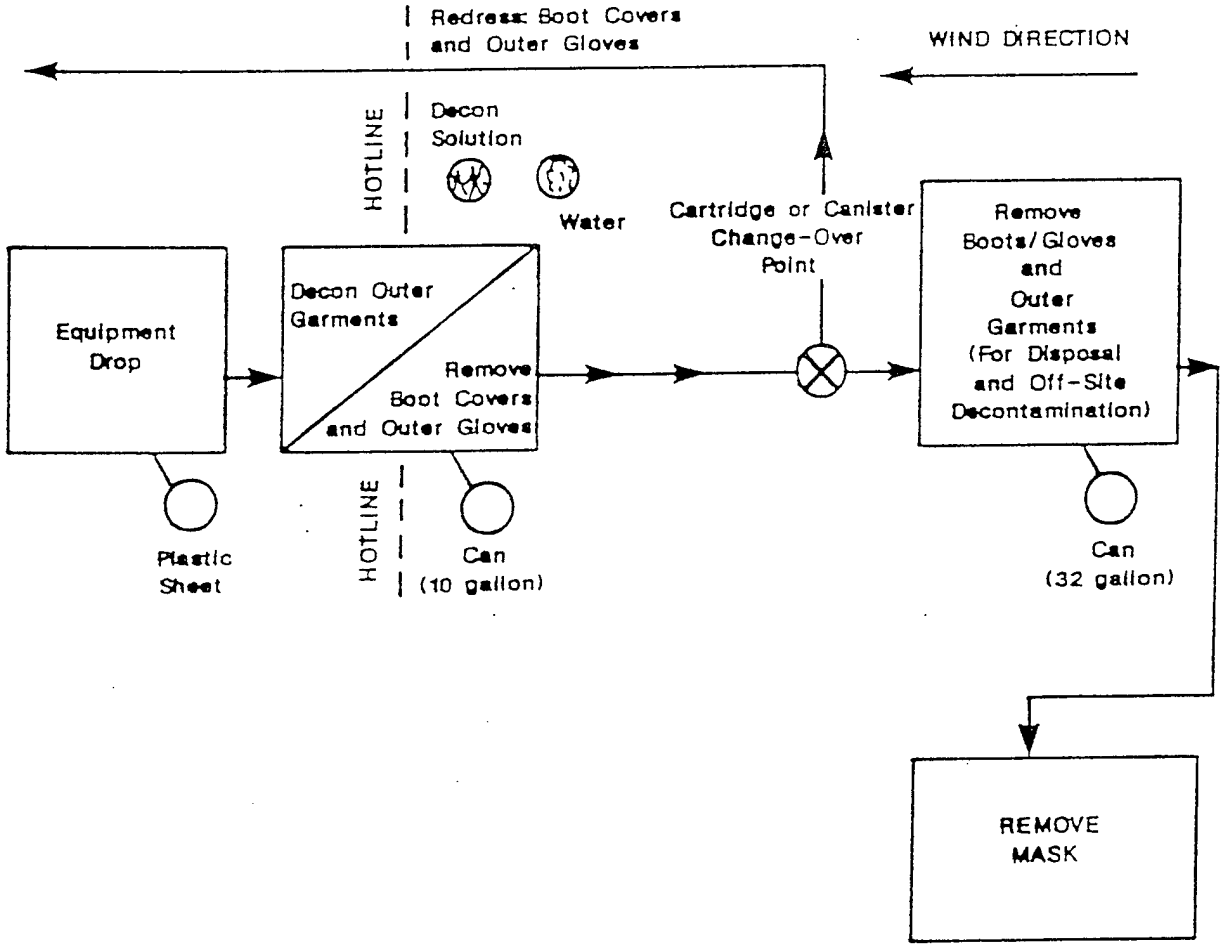
COMPLETE DECONTAMINATION LAYOUT FOR LEVEL C PROTECTION



SOURCE: USEPA 1983. Material Hazards Incidents Training Manual.

FIGURE 10.6

MINIMUM DECONTAMINATION LAYOUT FOR LEVEL C PROTECTION



SECTION 11

RECORDKEEPING

Good record keeping is essential for an effective health and safety program that will meet the needs of the contractor, ANGRC, and the requirements of state and federal laws and regulations. The following subsections describe the health and safety records that must be maintained.

11.1 HEALTH AND SAFETY TRAINING RECORDS

Document all formal training of contractor personnel and have these records kept by the Program Health and Safety Manager. Retain these records in the contractor's project health and safety file separate from the normal personnel records.

Each record of training must contain:

- Name and ID number of the person trained;
- Date of training;
- Content or scope of training provided;
- Names of the trainers; and
- Results of certification test (for 40-hour hazardous waste operations training).

Where it is required, field training (level B, instrumentation training, etc.) will be performed and documented by the Program Health and Safety Manager. These records will then be transferred to the contractor's health and safety files for permanent storage.

When an employee terminates, his or her training records are forwarded to the Corporate Health and Safety Manager. Each employee's training records are maintained during his or her employment with the contractor and for a period of 30 years after termination of employment with contractor.

11.2 MEDICAL SURVEILLANCE RECORDS

Two types of medical surveillance records must be kept: (1) The medical reports furnished by the physician to the Program Health and Safety Manager and (2) the clinical records of the employee's past medical history and the results of medical examinations.

11.2.1 Archival Storage of Medical Records

OSHA requires that the employer maintain and preserve medical records on potentially exposed workers for 30 years after they leave employment. The contractor Corporate Health and Safety Manager will maintain the medical surveillance records of terminated employees in a locked file separate from other personnel records. The sealed files shall not be opened by or

released to anyone except: (a) on express authorization by the employee – in which case copies of the records will be provided to the employee, (b) on direct order of a court, or (c) by order of an authorized federal or state OSHA representative.

11.2.2 Confidential Information

The physician's opinion report must be treated as confidential information. A separate, locked file is to be maintained for the segregation and storage of these reports. This information can only be made available to the site Health and Safety Coordinator, and the employee. The employee may request to review the medical opinion. The Program Health and Safety Manager will then transfer the physician's statement to the employee. The Program Health and Safety Manager must properly record the transfer of the document. The medical information must be returned to the locked file at the conclusion of each day. Copies of the report cannot be issued to unauthorized personnel or organizations without the employee's written consent. Copies of all confidential information must be sent with an accompanying transmittal form.

11.3 OSHA 200 FORM

The contractor is not required by federal law to maintain and post the OSHA No. 200 form (log and summary of occupational injuries and illnesses) because the contractor is classed under S.I.C (Standard Industrial Classification) code 8711, Engineering Services. (Our laboratories would be S.I.C. code 8734.) Under federal law, facilities with S.I.C. codes 87xx are exempt from the reporting requirements. However, several states have their own occupational safety and health programs qualified under federal OSHA. These state program requirements differ in some respects from the federal requirements.

The contractor maintains an up-to-date OSHA 200 log. The Program Health and Safety Manager is responsible for maintaining the log and summary of **all** occupational injuries and illnesses occurring on ANGRC projects.

Each injury or illness shall be recorded on the log as soon as practicable (but no later than six working days) after receiving information that an injury or illness has occurred. The OSHA 200 form is recommended for recording of this information.

The OSHA 200 form states that only 'recordable' (as defined on the form) injuries and illnesses be entered. However, all injuries and illnesses should be entered so that we have better information for evaluation of the contractor's health and safety program. Each recordable entry on the OSHA 200 form should be so marked. Injury and illness records shall be kept on a calendar year basis. The OSHA 200 form shall be retained in the contractor's corporate office for five years following the end of the year to which they pertain.

11.4 AUDIT REPORTS

A health and safety project audit refers to the auditing of project activities for compliance with the project health and safety plan, applicable contractor health and safety guidelines, and federal and state OSHA requirements. A project specific audit checklist will be developed based

on the in the project health and safety plan. An example of areas that will be addressed in an audit checklist for hazardous waste site investigations include:

- Decontamination procedures;
- Air-monitoring procedures;
- Emergency planning;
- Completeness of Site Health and Safety Plan;
- Choice of level of protection;
- Documentation of respirator fit-testing; and
- Documentation of health and safety training.

Audit reports will be prepared by the Program Health and Safety Manager after gathering and evaluating all available data. Items, activities, or documents determined to be deficient shall be identified at the post-audit meeting with the audited team. Deficiencies will be logged, documented, and controlled through Health and Safety Audit Notices that should be attached as part of the audit report. Project audit reports are sent to the Program and Project Manager.

Responses to audit findings must be addressed in a specified and timely manner. The adequacy of the response shall be evaluated by the Program health and Safety Manager. For a response to be considered adequate, it must:

1. Correct the situation that created the deficient conditions;
2. Provide a mechanism for preventing recurrence of the situation;
3. Identify the target date for the completion of these activities.

If the response is satisfactory, this fact will be noted on the Health and Safety Audit Notice form. After all notices have been accepted, the Program Health and Safety Manager will close out the audit report. Copies of the audit report and responses may be distributed to the appropriate levels of management.

11.5 ACCESS TO OTHER HEALTH AND SAFETY RECORDS

The majority of health and safety documents (accident reports, audit reports, etc.) shall be stored and maintained in a file with controlled access. Entry into the file shall be restricted to personnel designated by the Program Health and Safety Manager.

SECTION 12

REFERENCES

Earth Technology, February 1996. *Installation Restoration Program, Site Investigation Report.* OakRidge: Earth Tech, Inc.

Engineering-Science, Inc., December 1993. *Health and Safety Plan to Support Sampling Activities at Spring Valley, District of Columbia.* Fairfax: Engineering-Science.

Engineering-Science, Inc. November 1993. *Work Plan for a Site Investigation and Risk Assessment at the Washington Gas Light Site, Washington, D.C.* Fairfax: Engineering-Science

Engineering-Science, Inc. August 1991. *Hazard Communication Program for the Fairfax Engineering-Science Office and Laboratory.* Fairfax: Engineering-Science

ENSR Remediation and Construction, September 1993. Project Health and Safety Plan.

Parsons Environmental Remediation Project, March 1993. *Project Health and Safety Plan.* Fairfield: Parsons Environmental Services, Inc.

Parsons Environmental Services, Inc./Engineering-Science, Inc, March 1987. *Policy and Procedures for Health and Safety.* Pasadena: Parsons Corporate

APPENDIX B

VERIFICATION SAMPLING AND ANALYSIS PLAN

FINAL

APPENDIX B
ANG/CEVR
INSTALLATION RESTORATION PROGRAM
VERIFICATION SAMPLING AND ANALYSIS PLAN

Prepared For:

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DECEMBER 1997

APPENDIX B
TABLE OF CONTENTS

APPENDIX B
TABLE OF CONTENTS
(CONTINUED)

LIST OF FIGURES

LIST OF TABLES

SECTION 1

INTRODUCTION

1.1 PROJECT SCOPE

The Pennsylvania Air National Guard (PaANG) Station property is owned by the Pennsylvania State University (PSU) located in College Township. PaANG will undertake a non-time critical removal action at Site 2 of the PaANG at State College, Pennsylvania.

1.2. PLAN OBJECTIVES

This Verification Sampling and Analysis Plan (SAP) is intended to define the methods for conducting environmental sampling at Site 2 of PaANG at State College, Pennsylvania.

The objectives of the SAP are to:

- Confirm that the concentrations of constituents of concern (COC) detected in the remaining soils are less than the cleanup criteria (PADEP Statewide Health Standards: residential medium-specific concentrations (direct contact soil MSCs and soil-to-groundwater MSCs) or the USEPA Region III residential risk-based concentrations (RBCs);
- Characterize the removed soil/sediment for treatment or disposal; and
- Characterize the wastewater for treatment or disposal.

1.3 SAP SCOPE OF WORK

The following field activities will be performed as part of the removal action:

- **Soil/Sediment Sampling** - A total of 12 composite soil samples will be collected from the walls and bottom of the excavation. Sampling locations will be determined in the field. Three composite samples consisting of four grab samples will be collected from each face (i.e., walls and bottom) of the excavation and analyzed for SVOC, metals, and TPH. VOC analyses will be conducted on the grab samples (i.e., not the composite samples). Analyzing the grab samples for VOCs versus the composite samples prevents the potential loss of volatiles during the mixing of the grab samples to form the composite samples. (Refer to footnote No. 4 of Table B1.1.) The number of samples, analytical parameters and methods are summarized on Table B1.1.
- A total of 12 composite samples will be collected from the soil/sediment stockpile for characterization prior to removal from the site and offsite treatment or disposal. Each composite sample will consist of four grab samples from various locations of the stockpile and analyzed for SVOC, metals, and TPHs. VOC analyses will be conducted on the grab samples to avoid the potential for loss of

volatiles during the mixing process to form the composite samples (refer to footnote No. 4 of Table B1.1). The number of samples, analytical parameters and methods are summarized on Table B1.1.

- **Storage Tank Wastewater** - Water that has been in contact with the excavated soil/sediment (i.e., dewatering the excavation and decon waters) will be sampled prior to offsite treatment or disposal. The number of samples, analytical parameters, and methods are summarized on Table B1.1.

TABLE B1.1

SUMMARY OF SEDIMENT AND WATER SAMPLING PROGRAM
SITE 2 PaANG STATE COLLEGE, PENNSYLVANIA

Media	Sampling Strategy		Analytical Strategy		
	Number of Sampling Locations	Sampling Depths per Location	Parameters[3]	Number of Samples Analyzed	EPA Analytical Method [1]
Surficial Soil/Sediment	12 composite samples (i.e., made up of 4 grabs per composite)	0 to 6 inches in depth	VOCs[4] and SVOC TPH Total Metals	All samples[5]	SW8010/8020 SW8015 SW6010/7000
Soil/Sediment Stockpile	12 composite samples (i.e., made up of 4 grabs per composite)	0 to 6 inches in depth	TCLP VOCs[4] and SVOC Inorganic[2] Other[2]	All samples	SW1311 SW8240/8260 SW7470 TBD[2]
Tank Stored Waste-water	1 for every 5,000 gallons for the first 10,000 gallons (Total of 2) 1 for every 50,000 gallons thereafter	2 NA	VOC SVOC Inorganics[2] Other[2]	All Samples	SW8240 SW8270 TBD[2]

Abbreviations: TPH - Total Petroleum Hydrocarbons
TBD - To be Determined

Note: (1) Analytical method referenced in USEPA SW-846 Test Methods for Evaluating Solid Waste, Physical and Chemical Methods, 3rd edition, Revision 2, 1994. Surface soil/sediment will be analyzed in the field using a field GC. All other samples will be analyzed in the lab.
(2) Inorganics and other appropriate analyses required by the selected offsite treatment or disposal facility.
(3) Minimum analytical requirements.
(4) VOC analysis will be conducted on the grab samples and not the composites to prevent volatilization during the mixing process (formation of the composite samples) prior to field analyses using a GC.
(5) Field Duplicate and trip blank will be sent to the lab for analysis, which will represent 10% of the total samples.

SECTION 2

GENERAL FIELD GUIDELINES

2.1 SITE HAZARDS

Potential on-site surface hazards, such as sharp objects, overhead power lines, and building hazards, will be identified prior to initiation of field work. Generally, such hazards will be identified during a site visit that precedes the first day of field work.

2.2 UNDERGROUND UTILITIES

All underground utilities, including electric lines, gas lines, and communication lines, will be identified prior to initiation of subsurface work. All on-site underground utilities in the vicinity of proposed excavation will be located and marked by a representative of the Underground Facilities Protective Organization (UFPO): (800) 962-7962. UFPO will be notified at least two working days and not more than ten working days before subsurface work is conducted.

2.3 FIELD LOG BOOKS

All field activities will be carefully documented in field log books. Entries will be of sufficient detail that a complete daily record of significant events, observations, and measurements is maintained. The field log book will provide a legal record of the activities conducted at the site. Accordingly,

- Field books will be assigned a unique identification number.
- Field books will be bound, with consecutively numbered pages.
- Entries will be written with waterproof ink.
- Entries will be signed and dated at the conclusion of each day of field work.
- Corrections will be made by the person who made the original entries. Corrections will be made by drawing a line through the error, entering the correct information, and signing one's initials near and dating the time of the correction.

At a minimum, daily field book entries will include the following information:

- Location of field activity;
- Date and time of entry;
- Names and titles of field team members;
- Names, titles, and affiliations of any site visitors and site contacts;

- Weather information, for example: temperature, cloud coverage, wind speed and direction;
- Purpose of field activity;
- Detailed description of the field work conducted;
- Sample media (soil, sediment, groundwater, etc.);
- Sample collection method;
- Number and volume of sample(s) taken;
- Description of sampling point(s);
- Preservatives used;
- Analytical parameters;
- Date and time of collection;
- Sample identification number(s);
- Sample distribution (e.g., laboratory);
- Field observations;
- Any field measurements made, such as pH, temperature, conductivity, water level, etc.;
- References for all maps and photographs of the sampling site(s); and
- Information pertaining to sample documentation such as:
  - Bottle lot numbers;
  - Dates and method of sample shipments;
  - Chain-of-Custody Record numbers; and
  - Federal Express (or alternative overnight shipment) Air Bill Number.

SECTION 3

FIELD EQUIPMENT DECONTAMINATION

3.1 DECONTAMINATION AREA

A decontamination pad will be constructed to remove potentially contaminated soil from trucks and equipment prior to leaving the site. Decontamination will consist of pressure washing with potable water. Decontamination water will be sampled and transported offsite for treatment and disposal.

3.2 EQUIPMENT DECONTAMINATION

3.2.1 Trucks and Excavation Equipment

All trucks and equipment that work in the contaminated areas will be pressure washed prior to leaving the site.

3.2.2 Sampling Equipment

3.2.2.1 Materials

- Potable water
- Phosphate-free detergent (e.g., Alconox)
- Reagent-grade methanol or isopropanol
- Distilled water
- Aluminum foil
- Plastic/polyethylene sheeting
- Plastic buckets and brushes

3.2.2.2 Procedures

- Prior to sampling, all non-dedicated bowls, spoons, bailers, and any other tools will be washed with potable water and a phosphate-free detergent, such as Alconox. Decontamination of sampling equipment will be performed at the decontamination pad.
- The sampling equipment will then be rinsed with potable water followed by a reagent-grade methanol or isopropanol rinse and a distilled or deionized water rinse or steam cleaning.
- Between rinses, equipment will be placed on polyethylene sheets or aluminum foil, if necessary. At no time will washed equipment be placed directly on the ground.
- Equipment will be wrapped in polyethylene plastic or aluminum foil for storage or transportation from the designated decontamination area to the sampling location.

SECTION 4

FIELD SAMPLING PROCEDURES

4.1 INTRODUCTION

The following types of environmental sampling will be conducted at the site:

- Soil/Sediment sampling
- Wastewater sampling

Procedures for obtaining samples of various environmental media are described in this section. At a minimum, sampling procedure standards will be in accordance with the most recent PADEP and USEPA guidelines and/or regulations. The procedures described here are derived primarily from the following guidance documents:

- USEPA, 1979. Methods for Chemical Analysis of Water and Wastes. EPA 600-4-79-020.
- USEPA, 1984. Characterization of Hazardous Waste Sites - A Methods Manual: Volume II. Available Sampling Methods, 2nd edition. EPA 600/4-84-076.
- USEPA, 1993. Subsurface Characterization and Monitoring Techniques - Volume 1: Solids and Ground Water, Appendices A and B. EPA 625/R-93/003a.
- Air National Guard Site Investigation Protocol.

4.2 SOIL/SEDIMENT SAMPLING

The following equipment and method will be used to collect soil/sediment samples at the site.

4.2.1 Equipment

- Field book
- Project plans
- Personal protective equipment in accordance with the Health and Safety Plan
- Decontamination supplies
- Stainless steel bowls and spoons
- Plastic sheeting
- Camera

- Clear tape, duct tape
- Coolers
- Laboratory sample bottles
- Federal Express labels

4.2.2 Soil/Sediment Sampling Method

- The soil/sediment excavation faces (i.e., walls and bottom) and the soil/sediment stockpile will be sampled.
- Soil/sediment samples will be collected from the upper six inches of soil/sediment of the excavation faces or the stockpile using stainless steel bowls and spoons.
- Soil/sediment from a minimum of four grab samples of equal volume will be placed into a decontaminated stainless steel mixing bowl and the composite samples will be placed in the appropriate containers and analyzed for SVOC, metals, and TPH.
- The grab samples for VOC analysis will not be mixed or composited to prevent volatilization. Each grab sample will be placed in the appropriate container for VOC analysis.
- The sample containers will be labeled, placed in a laboratory supplied cooler, packed on ice, and stored at a temperature of 4^{o} C.
- Chain-of-custody procedures will be followed as outlined in the Quality Assurance/Quality Control Plan.
- The cooler will be shipped overnight or delivered to the laboratory for analysis.
- The sampling equipment will be decontaminated between samples in accordance with procedures described in Section 3.
- The sample locations, descriptions, and depth will be recorded in the field book.

4.3 WASTEWATER SAMPLING

The following equipment and method will be used to collect wastewater samples (i.e., excavation water and decon water) from the temporary storage tank.

4.3.1 Equipment

- Field book
- Project plans
- Personal protective equipment in accordance with the HASP
- 250-mL glass beaker
- Decontamination supplies
- Plastic sheeting

- Clear tape, duct tape
- Coolers and ice
- Laboratory sample bottles
- Federal Express labels

4.3.2 Wastewater Sampling Method

- Prior to filling the sample bottles, one decontaminated 250-mL beaker will be filled with wastewater.
- Sample bottles will be filled.
- The sample bottles will be labeled, placed in a laboratory-supplied cooler, packed on ice, and stored at a temperature of 4° C.
- Chain-of-custody procedures will be followed as outlined in the Quality Assurance/Quality Control Plan.
- The cooler will be shipped overnight or delivered to the laboratory for analysis.
- The sampling equipment will be decontaminated between samples in accordance with the procedures described in Section 3.
- The sample locations and descriptions will be recorded in the field book.

SECTION 5

FIELD SAMPLE IDENTIFICATION AND CUSTODY

5.1 SAMPLE LOCATION NUMBERING SYSTEM

Surface Soil/Sediment Samples

Surface soil/sediment samples will be numbered consecutively beginning with SS01.

Wastewater Samples

Wastewater samples will be numbered consecutively beginning with WW01.

5.2 SAMPLE IDENTIFICATION

Each sample will be given a unique alphanumeric identifier in accordance with the following classification system:

SAMPLE IDENTIFICATION

LL*	NN**	L	LL
Sample Type	Sample Number	Depth Code	QC Identifier

	Solid	Water
Sample Type:	SD - Sediment SS - Surface Soil SB - Soil Boring MW - Monitoring Well Boring TP - Test Pit/Tank Pit DR - Drum Waste WA - Solid Waste OS - Other Solid Waste AS - Air Sample	MW - Monitoring Well LC - Leachate SW - Surface Water DW - Drill Water MH - Manhole ST - Storm Water WW - Waste Water OL - Other Liquid WT - Surface Water Toxicity
Sample Number	Number referenced to a sample location map	
Depth Code	Depth in feet of sample interval (i.e., A-0 to 6 inches; B=6 to 12 inches, etc.)	
QC Identifier:	FB - Field Blank TB - Trip Blank WB - Wash Blank MS - Matrix Spike MD - Matrix Spike Duplicate MB - Matrix Blank	

* L = Letter

** N = Number

Each sample container will be labeled prior to packing for shipment. The sample identifier, site name, date and time of sampling, and analytical parameters will be written on the label in waterproof ink and recorded in the field book.

5.3 CHAIN OF CUSTODY

- A chain-of-custody (COC) record (Figure 5.1) will accompany the sample containers during selection and preparation at the laboratory, during shipment to the field, and during return shipment to the laboratory.
- The COC will identify each sample container and the analytical parameters for each, and will list the field personnel that collected the samples, the project name and number, the name of the analytical laboratory that will receive the samples, and the method of sample shipment.
- The COC will be completed by field personnel as samples are collected and packed for shipment.
- Erroneous markings will be crossed-out with a single line and initialed by the author.
- After the samples have been collected and sample information has been listed on the COC form, the method of shipment, the shipping cooler identification number(s), and the shipper airbill number will be entered on the COC.
- Finally, a member of the sampling team will write his/her signature, the date, and time on the first RELINQUISHED BY space. Duplicate copies of each COC must be completed.
- One copy of the COC will be retained by sampling personnel. The other copy and the original will be sealed in a plastic bag and taped inside the lid of the shipping cooler.
- Sample shipments will be refrigerated at $4^{o}C$, typically by packing with ice, to preserve the samples during shipment.
- After the shipping cooler is closed, custody seals provided by the laboratory will be affixed to the latch and across the front and back of the cooler lid, and signed by the person relinquishing the samples to the shipper.
- The seal will be covered with clear tape, and the cooler lid will be secured by wrapping with packing tape.
- Then the cooler will be relinquished to the shipper, typically an overnight carrier.
- The COC seal must be broken to open the container. Breakage of the seals before receipt at the laboratory may indicate tampering. If tampering is apparent, the laboratory will contact the Project Manager to determine if the samples will be analyzed.

- The samples must be delivered to the laboratory within 48 hours of collection.

5.4 SAMPLE DOCUMENTATION

The sampling leader will retain a copy of the COC, submit an original copy to the construction manager, and ensure that the following information about each sample is recorded in the field book:

- Sample identifier;
- Identification of sampled media (e.g., soil, sediment, groundwater);
- Sample location with respect to known reference point;
- Physical description of sample location;
- Field measurements (e.g., pH, temperature, conductivity, and water levels);
- Date and time of collection;
- Sample collection method;
- Number of sample containers;
- Analytical parameters;
- Preservatives used; and
- Shipping information:
- Dates and method of sample shipments;
- Chain-of-Custody Record numbers;
- Federal Express Air Bill numbers; and
- Sample recipient (e.g., laboratory name).

PO# 87009103005-GHM

CHAIN OF CUSTODY RECORD

NO: 1885

CLIENT:	PROJECT NO.	PROJECT MGR:	TYPES OF ANALYSES REQUESTED	Send results to:
PROJECT NAME:	NOTES – (Reference QAPP and/or analytical protocols to be used):			PARSONS ENGINEERING SCIENCE, INC 290 Elwood Davis Road–Suite 312 Liverpool, NY 13088 Telephone: (315) 451–9560 Fax: (315) 451–9570
SAMPLERS:				Lab Submitted to:

FIELD SAMPLE ID: TYPE	NUMBER	DEPTH CODES / QC IDENTIFIERS	Location Description	Date	Time	GRAB	COMP	NO OF Bottles	Matrix / Preservative / Remarks
X X	0 0 1	0 0 1 – 0 0 2							

Relinquished by: (Signature)	Date:	Time:	Shipped via:	Airbill #:	Received by: (Signature)	Date:	Time:	Cooler Temp: °C Samples Intact Yes No
Relinquished by: (Signature)	Date:	Time:	Shipped via:	Airbill #:	Received by: (Signature)	Date:	Time:	Cooler Temp: °C Samples Intact Yes No
Relinquished by: (Signature)	Date:	Time:	Shipped via:	Airbill #:	Received by: (Signature)	Date:	Time:	Cooler Temp: °C Samples Intact Yes No

TYPE CODES:

SOLID
- SD – Sediment
- SS – Surface Soil
- SB – Subsurface Soil
- MW – Monitoring Well Boring
- TP – Test Pit/Tank Pit
- DR – Drum Waste
- WA – Solid Waste
- OS – Other Solid (eg. wipe samples, asbestos, etc.)

WATER
- MW – Monitoring Well
- LC – Leachate
- SW – Surface Water
- DW – Drill Water
- FD – Fuel Dispenser
- MH – Manhole
- OW – Oil Water Separator
- PR – Piping Run
- ST – Storm Water
- WW – Waste Water
- OL – Other Liquid (eg. Drum liquid)

QUALITY CONTROL
- FB – Field Blank (number each)
- TB – Trip Blank (number each)
- WB – Wash Blank (number each)

NO: 1885

Parsons Engi[redacted] Science, Inc.

Revised: [redacted] Aug–95

[redacted]se/chain.wk3

Figure 5.1
Chain-of-Custody

APPENDIX C

QUALITY ASSURANCE / QUALITY CONTROL PLAN

FINAL

APPENDIX C
ANG/CEVR
INSTALLATION RESTORATION PROGRAM
QUALITY ASSURANCE/QUALITY CONTROL PLAN

Prepared For:

STATE COLLEGE AIR NATIONAL GUARD STATION
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DECEMBER 1997

APPENDIX C

TABLE OF CONTENTS

APPENDIX C

TABLE OF CONTENTS (CONTINUED)

LIST OF FIGURES

LIST OF TABLES

SECTION 1

INTRODUCTION

1.1 PROJECT SCOPE

The Pennsylvania Air National Guard (PaANG) Station property is owned by the Pennsylvania State University (PSU) located in College Township, Pennsylvania. PaANG will undertake a non-time critical removal action at Site 2 of the PaANG at State College, Pennsylvania.

1.2 PLAN OBJECTIVES

This Quality Assurance/Quality Control Plan has been prepared by Parsons Engineering Science, Inc. (Parsons ES), for Pennsylvania Air National Guard in support of the Site 2 removal action. This plan describes the guidelines to be followed for quality assurance (QA) and quality control (QC) during the removal action. Lines of communication and QA/QC responsibilities are defined. In addition, this plan specifies analytical methods to be used to ensure that data from the removal action are representative and comparable.

1.3 SCOPE OF WORK

The scope of the Site 2 removal action is described in the project work plan. After contaminated soil/sediment is removed, samples will be collected from the remaining soil/sediment (walls and bottom of the excavation) to confirm that the concentration of contaminants in the remaining soil are less than the cleanup criteria (PADEP Statewide Health Standards: residential medium-specific concentrations (MSCs) or the USEPA Region III residential risk-based concentrations (RBCs)). Samples will also be taken from the soil/sediment stockpile for characterization prior to treatment or disposal offsite. Additionally, samples will be collected from wastewater contained in a temporary storage tank generated from dewatering of the excavation or decontamination (decon) waters. These samples will be analyzed in compliance with USEPA SW-846 "Test Methods for Evaluating Solid Waste," 3rd edition, prior to the shipment offsite of the soil/sediment and wastewater for treatment and disposal. All laboratory analyses shall meet EPA QA Level III, with full data package reporting.

SECTION 2

QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) OBJECTIVES

2.1 INTRODUCTION

Careful quality assurance and quality control testing of the materials and services used in the performance of the removal action is an important aspect of the construction process. The QA/QC requirements are intended to provide a level of confidence to the Owner, Engineer, and the public that the completed project was constructed in accordance with the approved design. The program proposed in this plan provides added control over the quality of the completed project and greater confidence in the cleanup of Site 2 at PaANG State College, Pennsylvania.

Definitions of quality assurance (QA) and quality control (QC) adapted for this project are as follows:

1. **Quality assurance** consists of a planned and systematic pattern of all means and actions designed to provide adequate confidence that items or services meet contractual requirements and will perform as designed. Quality assurance includes the review of work performed in the field and the testing of installed materials to verify compliance with the design (work plan and drawings/ specifications). Overall quality assurance means and actions also include quality control.

2. **Quality control** consists of those actions which provide a means to measure and regulate the characteristics of an item or service to contractual and regulatory requirements. These actions are comprised both of the specification of testing methods and frequencies as well as specifying minimum levels of experience and training for the individuals and organizations performing the work. In general, quality control is performed prior to allowing individuals and organizations to perform the work and prior to accepting materials for delivery to the work site as a means for prequalification of services and materials and continues throughout construction to evaluate the consistency of products and services.

The QA and QC objectives for all measurement data include representativeness and comparability. These objectives are defined in the following subsections. They have been formulated to meet the requirements of the USEPA SW-846. The analytical methods and their Practical Quantitation Limits (PQLs) are given in Section 6.

2.2 REPRESENTATIVENESS

Representativeness expresses the degree to which sample data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, or an environmental condition. Representativeness is a qualitative parameter that is most concerned with the proper design of the sampling program (USEPA, 1987). Samples must be representative of the environmental media being sampled. Selection of sample locations and sampling procedures will incorporate consideration of obtaining the most representative sample possible.

Field and laboratory procedures will be performed in such a manner as to ensure, to the degree that is technically possible, that the data derived represents the in-place quality of the material sampled. Every effort will be made to ensure chemical compounds will not be introduced into the sample via sample containers, handling, and analysis. Decontamination of sampling devices and digging equipment will be performed between samples as outlined in the Verification Sampling and Analysis Plan (Appendix B). Laboratory sample containers will be thoroughly cleaned in accordance with procedures outlined in Section 3 of the Verification Sampling and Analysis Plan.

The assessment of representativeness also must consider the degree of heterogeneity in the material from which the samples are collected. The analytical laboratory will also follow acceptable procedures to ensure that the samples are adequately homogenized prior to taking aliquots for analysis, so that the reported results are representative of the sample received.

Chain-of-custody (COC) procedures will be followed to document that contamination of samples has not occurred during container preparation, shipment, and sampling. Details of COC procedures are presented in Section 4.

2.3 COMPARABILITY

Comparability expresses the degree of confidence with which one data set can be compared to another (USEPA, 1987). The comparability of all data collected for this project will be ensured by:

- Using identified standard methods for both sampling and analysis phases of this project;
- Requiring traceability of all analytical standards and/or source materials to the U.S. Environmental Protection Agency (USEPA) or National Institute of Standards and Technology (NIST);
- Requiring that all calibrations be verified with an independently prepared standard from a source other than that used for calibration (if applicable);
- Using standard reporting units and reporting formats including the reporting of QC data; and

- Requiring that all validation qualifiers be used any time an analytical result is used for any purpose.

These steps will ensure that all future users of either the data or the conclusions drawn from them will be able to judge the comparability of these data and conclusions.

2.4 LINES OF COMMUNICATIONS

By delineating lines of communication, questions, concerns and problems can be more effectively and efficiently addressed and resolved. For this project, the number of parties which communicate directly to the Owner have been limited to isolate overall responsibilities for QA/QC. All items which arise in the field should be directed to the Contractor, who can resolve the situation or bring it to the attention of the Construction Manager/Engineer, who will in turn convey any issues to the ANG and the Contracting Officer, and the regulator, if necessary. By developing efficient and direct lines of communication, the reporting and resolution of issues (e.g., problems and changes) should be efficiently handled, thereby reducing work stoppages and delays.

2.5 MEETINGS

To assist in the proper communication of problems and their resolutions, a series of meetings will be held. Prior to the commencement of construction, a preconstruction meeting will be held. This meeting should be attended by a representative of the PADEP, the Construction Manager/Engineer, PaANG, and Contractor. During this meeting, the lines of communication will be reviewed and specified procedures for QA/QC testing will be established.

Additional progress meetings will be conducted on a weekly basis (i.e., one meeting per week) during construction. Attendees at progress meetings will include the PaANG, the Contractor, the Construction Manager/Engineer, and the PADEP. The purpose of these meetings is to review work progress, identify problems affecting progress and schedules, review delivery schedules, discuss any corrective measures, and maintain quality standards throughout the project.

2.6 QA/QC ROLES AND RESPONSIBILITIES

This section summarizes roles and responsibilities of key personnel or organizations involved in the removal action.

1. **Regulator.** The primary role of the regulatory agency is to verify compliance with PADEP regulations. Additional roles and responsibilities of the Regulator are as follows: (a) promptly review design modifications, change and variance requests and work with the ANG, Contracting Officer, and Construction Manager/Engineer to efficiently reach decisions and provide approvals; and (b) promptly review QA/QC testing results and work with the ANG, Contracting Officer, and Construction Manager/Engineer to resolve required remediation of unacceptable areas, if encountered.

2. **ANG and Contracting Officer.** The general roles and responsibilities of the ANG and Contracting Officer are as follows: (a) communicate with the Construction Manager/Engineer regarding proposed modifications and changes; and (b) promptly submit required and requested information to the regulator.

3. **Construction Manager/Engineer.** The general roles and responsibilities of the Construction Manager/Engineer are to: (a) assist in the selection of products in consultation with the ANG and Contracting Officer and transmit decisions to Contractor; (b) consult with the Contractor and ANG and Contracting Officer in consideration and selection of suppliers and installers, and to consult with the regulator; (c) inspect and check results of field engineering services for conformance with Contract Documents; and (d) conduct and document progress meetings.

4. **Contractor.** The Contractor will assist the Construction Manager/Engineer, ANG and Contracting Officer in the selection of products and suppliers, obtain supplier proposals, coordinate purchase agreements, arrange for the process shop drawings, arrange for product and equipment delivery, inspect products and equipment, install products and equipment, provide equipment O&M manuals, oversee work of subcontractors, and prepare schedules. Unless specifically stated otherwise, the term "Contractor" throughout the work plan and drawings/specifications refers to the remediation contractor.

SECTION 3

SAMPLING PROGRAM

3.1 INTRODUCTION

The sampling program will provide data concerning the nature and extent of contamination of the remaining soil in the walls and bottom of the excavation and wastewater (i.e., water from dewatering the excavation and decon water). This section presents sample container preparation procedures, sample preservation procedures, and sample holding times. Sample parameters and the number of environmental samples to be taken are given in Table C3.1. Sampling procedures are presented in the Verification Sampling and Analysis Plan (Appendix B).

3.2 SAMPLE CONTAINER PREPARATION AND SAMPLE PRESERVATION

Sample containers will be properly washed and decontaminated prior to their use by either the analytical laboratory or the container vendor to the specifications required by the USEPA. Copies of the sample container QC analyses will be provided by the laboratory for each container lot used to obtain samples. The containers will be tagged, and the appropriate preservatives will be added. The types of containers are described in Tables C3.2 and C3.3.

Samples shall be preserved according to the preservation techniques given in Tables C3.2 and C3.3. Preservatives will be added to the sample bottles by the laboratory prior to their shipment in sufficient quantities to ensure that proper sample pH is met. Following sample collection, the sample bottles should be placed on ice in the shipping cooler, cooled to 4°C with crushed ice, and delivered to the laboratory within 48 hours of collection. COC procedures are described in Section 4.

3.3 SAMPLE HOLDING TIMES

The sample holding times for the analytical parameters are given in Tables C3.2 and C3.3. These holding times must be strictly adhered to by the onsite or offsite laboratories. Any holding time exceedances must be reported to the project manager.

TABLE C3.1

SUMMARY OF SAMPLES AND ANALYSES
SITE 2 PaANG STATE COLLEGE, PENNSYLVANIA

Matrix	Parameter[3]	Analytical Method [1]	Field Samples			QC SamplesSamples		Total
			Number of Samples	Field Duplicate	MS/MSD	Trip Blank	Field Blank	
Surficial Soil/ Sediment	VOCs[4] & SVOCs TPH Total Metals	SW8010/8020 SW8015 SW6010/7000	12 composite samples (i.e., made up of 4 grabs per composite)	1 (10%)[5]-	NA	1 per cooler[5]	1 per source per event	15
Soil/ Sediment Stockpile	TCLP VOCs[4] & SVOCs Inorganics[2] Other[2]	SW1311 SW8240/8260 SW7470 TBD[2]	12 composite samples (i.e., made up of 4 grabs per composite)	1	NA	1	1	15
Tank Stored Wastewater	VOC SVOC Inorganics[2] Other[2]	SW8240 SW8270 TBD[2]	1 for every 5,000 gallons for the first 10,000 gallons (Total of 2). 1 for every 50,000 gallons thereafter.	-	-	-	-	Will vary depending on water volume.

Abbreviations: TBD - To be Determined
TPH - Total Petroleum Hydrocarbons
NA - Not Applicable

Note: [1] Analytical method referenced in USEPA SW-846 Test Methods for Evaluating Solid Waste, Physical and Chemical Methods, 3rd edition, Revision 2, 1994. Surface soils/sediment will be analyzed in the field using a field GC. All other samples will be analyzed in the lab.

[2] Inorganics and other appropriate analyses required by the selected offsite treatment or disposal facility.

[3] Minimum analytical requirements.

[4] VOC analysis will be conducted on the grab samples and not the composites to prevent volatilization during the mixing process (formation of the composite samples) prior to field analyses using a GC.

[5] Field duplicate and trip blank will be sent to the lab for analysis, which will represent 10% of the total samples.

TABLE C3.2

SOIL AND SEDIMENT SAMPLING SPECIFICATIONS SITE 2 PaANG STATE COLLEGE, PENNSYLVANIA

Parameter	Container	Sample Preservation	Holding Time
Volatile Organics	Two 40 ml glass VOA vials. No headspace	Ice to 4°C	Analyze within 14 days <24 hours on site.
Total Recoverable Petroleum Hydrocarbons	1-8 oz. glass wide mouth bottle	Ice to 4°C	Extract within 14 days. Analyze within 40 days.
Semivolatile Organics	1-8 oz. amber glass bottle	Ice to 4°C	Extract within 7 days. Analyze within 40 days.
Total Recoverable Metals	1-8 oz. glass wide-mouth bottle	Ice to 4°C	38 days

All containers must have Teflon-lined lids.

TABLE C3.3

WASTEWATER SAMPLING SPECIFICATIONS
SITE 2 PaANG STATE COLLEGE, PENNSYLVANIA

Parameter	Container	Sample Preservation	Holding Time
Volatile Organics	Two 40 ml glass VOA vials. No headspace	2 drops 1:1 Hcl per vial. Ice to 4°C. Store inverted	Analyze within 14 days.
Total Recoverable Petroleum Hydrocarbons	1-liter amber glass bottle	1:1 Hcl to pH <2. Ice to 4°C	Analyze within 28 days.
Semivolatile Organics	Four 1-liter amber glass bottles	Ice to 4°C	Extract within 7 days. Analyze within 40 days.
Total Recoverable Metals	1-liter high density polyethylene bottle	1:1 HNO_3 to pH <2. Ice to 4°C	13 days (Hg), others 6 mos.

All containers must have Teflon-lined lids.

SECTION 4

SAMPLE TRACKING AND CUSTODY

4.1 INTRODUCTION

This section presents sample custody procedures for both the field and laboratory. Implementation of proper custody procedures for samples generated in the field is the responsibility of field personnel. Both laboratory and field personnel involved in the chain of custody (COC) and transfer of samples will be trained as to the purpose and procedures prior to implementation.

Evidence of sample traceability and integrity is provided by COC procedures. These procedures document the sample traceability from the selection and preparation of the sample containers by the laboratory to sample collection, sample shipment, and finally to laboratory receipt and analysis. The sample custody flowchart is shown in Figure 4.1. A sample is considered to be in a person's custody if the sample is:

- In a person's possession;
- Maintained in view after possession is accepted and documented;
- Locked and tagged with Custody Seals so that no one can tamper with it after having been in physical custody; or
- In a secured area that is restricted to authorized personnel.

4.2 FIELD SAMPLE CUSTODY

A COC record (Figure 4.2) accompanies the sample containers from selection and preparation at the laboratory, during shipment to the field for sample containment and preservation, and during return to the laboratory. Triplicate copies of the COC must be completed for each sample set collected.

Once all bottles are properly accounted for on the form, a sampler will write his or her signature and the date and time on the first "Relinquished by" space. The sampler will also write the method of shipment, the shipping cooler identification number, and the shipper airbill number on the top of the COC. Mistakes will be crossed out with a single line in ink and initialed by the author.

One copy of the COC is retained by sampling personnel and the other two copies are put into a sealable plastic bag and taped inside the lid of the shipping cooler. The cooler lid is closed, custody seals provided by the laboratory are affixed to the latch and across the back and front lids of the cooler, and the person relinquishing the samples signs their

name across the seal. The seal is taped, and the cooler is wrapped tightly with clear packing tape. It is then relinquished by field personnel to personnel responsible for shipment, typically an overnight carrier.

The COC seal must be broken to open the container. Breakage of the seals before receipt at the laboratory may indicate tampering. If tampering is apparent, the laboratory will contact the Project Manager.

4.3 LABORATORY SAMPLE CUSTODY

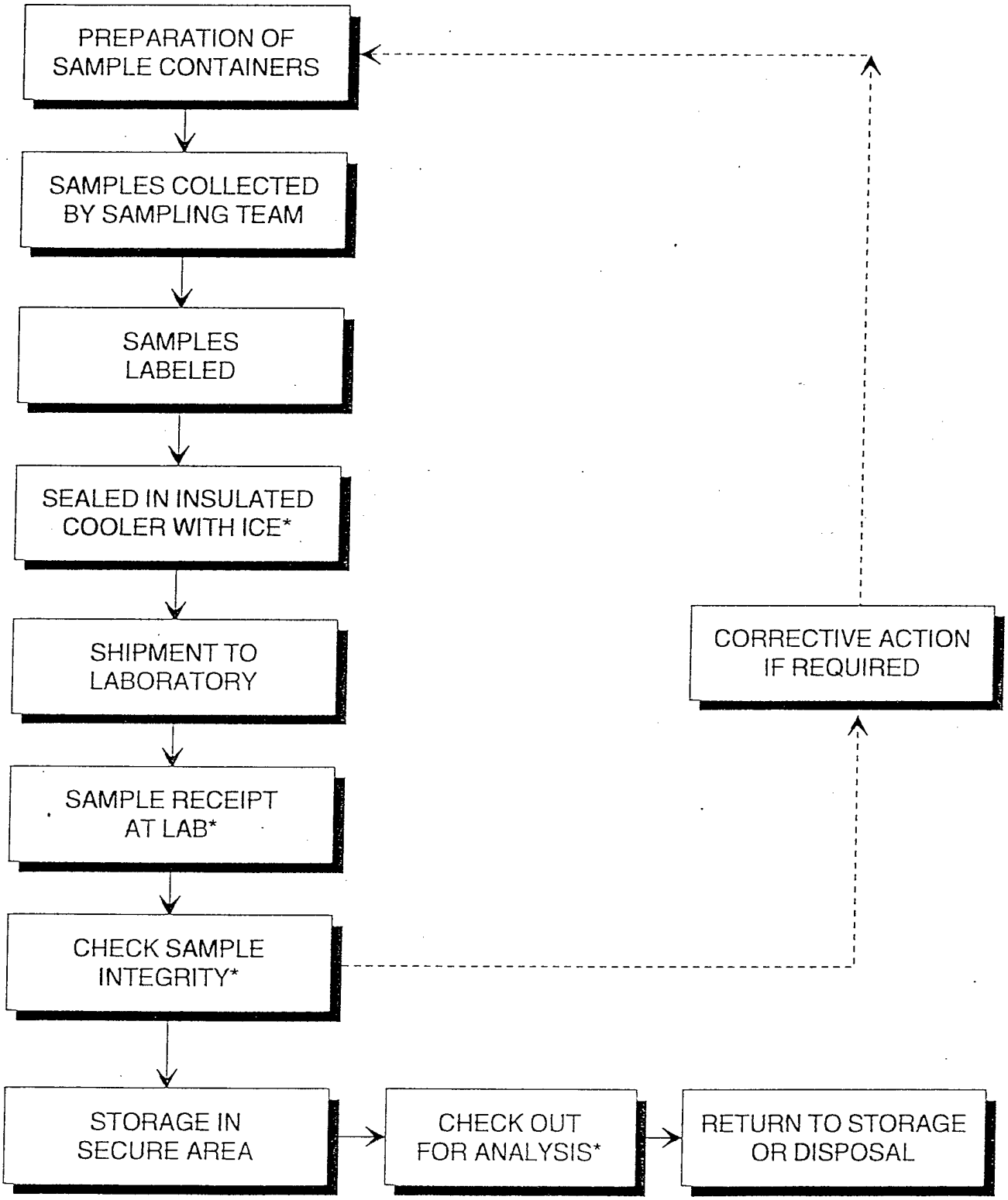
The Project Manager will notify the laboratory of upcoming field sampling activities and the subsequent shipment of samples to the laboratory. This notification will include information concerning the number and type of samples to be shipped as well as the anticipated date of arrival.

The following laboratory sample custody procedures will be used:

- The laboratory will designate a sample custodian who will be responsible for maintaining custody of the samples and for maintaining all associated records documenting that custody.
- Upon receipt of the samples, the custodian will check cooler temperature and the original COC documents and compare them with the labeled contents of each sample container for correctness and traceability. The sample custodian will sign the COC record and record the date and time received.
- Care will be exercised to annotate any labeling or descriptive errors. In the event of discrepant documentation, the laboratory will immediately contact the Project Manager as part of the corrective action process. A qualitative assessment of each sample container will be performed to note any anomalies, such as broken or leaking bottles. This assessment will be recorded as part of the incoming chain-of-custody procedure.
- The samples will be stored in a secured area at a temperature of approximately 4 degrees Celsius until analyses commence.
- A laboratory tracking record will accompany the sample or sample fraction through final analysis for control.
- A copy of the tracking record will accompany the laboratory report and will become a permanent part of the project records.

FIGURE 4.1

SAMPLE CUSTODY



* REQUIRES SIGN-OFF ON CHAIN OF CUSTODY FORM.

PO# 87009103005-GHM

CHAIN OF CUSTODY RECORD

NO: 1886

CLIENT:	PROJECT NO.	PROJECT MGR:	TYPES OF ANALYSES REQUESTED	Send results to:
PROJECT NAME:	NOTES – (Reference QAPP and/or analytical protocols to be used):			PARSONS ENGINEERING SCIENCE, INC 290 Elwood Davis Road–Suite 312 Liverpool, NY 13088 Telephone: (315) 451–9560 Fax: (315) 451–9570
SAMPLERS:				Lab Submitted to:

FIELD SAMPLE ID: TYPE / NUMBER / DEPTH CODES / QC IDENTIFIERS	Location Description	Date	Time	GRAB	COMP	NO OF Bottles	Matrix / Preservative / Remarks
XX 001 001–002							

Relinquished by: (Signature)	Date:	Time:	Shipped via:	Airbill #:	Received by: (Signature)	Date:	Time:	Cooler Temp: °C Samples Intact Yes No
Relinquished by: (Signature)	Date:	Time:	Shipped via:	Airbill #:	Received by: (Signature)	Date:	Time:	Cooler Temp: °C Samples Intact Yes No
Relinquished by: (Signature)	Date:	Time:	Shipped via:	Airbill #:	Received by: (Signature)	Date:	Time:	Cooler Temp: °C Samples Intact Yes No

TYPE CODES:

SOLID
- SD–Sediment
- SS–Surface Soil
- SB–Subsurface Soil
- MW–Monitoring Well Boring
- TP–Test Pit/Tank Pit
- DR–Drum Waste
- WA–Solid Waste
- OS–Other Solid (eg. wipe samples, asbestos, etc.)

WATER
- MW–Monitoring Well
- LC–Leachate
- SW–Surface Water
- DW–Drill Water
- FD–Fuel Dispenser
- MH–Manhole
- OW–Oil Water Separator
- PR–Piping Run
- ST–Storm Water
- WW–Waste Water
- OL–Other Liquid (eg. Drum liquid)

QUALITY CONTROL
- FB–Field Blank (number each)
- TB–Trip Blank (number each)
- WB–Wash Blank (number each)

NO: 1886

Parsons Eng[redacted]ng Science, Inc.

Revise[redacted]–Aug–95

[redacted]ase/chain.wk3

Figure 4.2
Chain-of-Custody Record

SECTION 5

CALIBRATION PROCEDURES

5.1 FIELD INSTRUMENTS

The standard manufacturer's procedures for the field gas chromatograph, selected for field sampling operations during the removal action, will be used as the guidelines for the calibration of the instrument. In addition, calibration procedures and schedules as specified in the sections of the USEPA SW-846 that apply to the instruments necessary for the analytical method will be followed.

Calibration procedures for instruments used for monitoring health and safety hazards (e.g., photoionization detector and explosimeter) are provided in the Health and Safety Plan.

5.2 LABORATORY INSTRUMENTS

The laboratory will follow all calibration procedures and schedules as specified in the sections of the USEPA SW-846 that apply to the instruments necessary for the analytical methods given in Section 6 (USEPA, 1994).

SECTION 6

ANALYTICAL PROCEDURES

Samples will be analyzed according to the USEPA SW-846 Test Methods for Evaluating Solid Waste (USEPA, 1994). The methods to be used for the laboratory analysis of sediment and water samples are presented in Table 6.1.

TABLE C6.1

SCOPE OF ANALYTICAL METHODS FOR SEDIMENT AND WASTEWATER SAMPLES

Media	Analytical Strategy	
	Parameters[3]	EPA Analytical Method [1]
Surficial Soil/Sediment	VOC[4] & SVOCs TPH Total Metals	SW8010/8020 SW8015 SW6010/7000
Soil/Sediment Stockpile	TCLP VOCs[4] & SVOCs Inorganics[2] Other	SW1311 SW8240/8260 SW7470 TBD[2]
Tank Stored Wastewater	VOC SVOC Inorganics[2] Other[2]	SW8240 SW8270 TBD[2]

Abbreviations: TBD - To be Determined
TPH - Total Petroleum Hydrocarbons

Note: [1] Analytical method referenced in USEPA SW-846 Test Methods for Evaluating Solid Waste, Physical and Chemical Methods, 3rd edition, Revision 2, 1994. Surface soils/sediment will be analyzed in the field using a field GC. All other samples will be analyzed in the lab.

[2] Inorganics and other appropriate analyses required by the selected offsite treatment or disposal facility.

[3] Minimum analytical requirements.

[4] VOC analysis will be conducted on the grab samples and not the composites to prevent volatilization during the mixing process (formation of the composite samples) prior to field analyses using a GC.

SECTION 7

DATA REPORTING

The laboratory analytical results will be included in the closure report for the soil/sediment removal action. The laboratory will assign one of the following qualifiers to each analytical result:

- "U" - Not detected at given value;
- "UJ" - Estimated not detected at given value;
- "J" - Estimated value;
- "N" - Presumptive evidence of a compound;
- "R" - Result not useable, and
- No Flag - Result accepted without qualification.

If a qualifier is not assigned, then the sample results are considered acceptable and compliant at the sample concentration given.

SECTION 8

CORRECTIVE ACTION

8.1 INTRODUCTION

The following procedures have been established to ensure that conditions adverse to quality, such as malfunctions, deficiencies, deviations, and errors, are promptly investigated, documented, evaluated, and corrected.

All project personnel have the responsibility, as part of the normal work duties, to promptly identify, solicit approved correction and report conditions adverse to quality. Corrective actions will be initiated under the following conditions:

- When predetermined acceptance standards are not attained;
- When procedure or data compiled are determined to be deficient;
- When equipment or instrumentation is found to be faulty;
- When samples and analytical test results are not clearly traceable;
- When quality assurance requirements have been violated;
- When designated approvals have been circumvented;
- As a result of system and performance audits;
- As a result of a management assessment;
- As a result of laboratory/field comparison studies; and/or
- As required by USEPA SW-846.

8.2 PROCEDURE DESCRIPTION

When a significant condition adverse to quality is noted at the site or laboratory the cause of the condition will be determined and corrective action will be taken to preclude repetition. Condition identification, cause, reference documents, and corrective action planned to be taken will be documented and reported to the Project Manager at a minimum. Implementation of corrective action is verified by documented follow-up action.

The project manager and laboratory personnel will monitor on-going work performance in the normal course of daily responsibilities. Activities or documents ascertained to be non-compliant with quality assurance requirements will be documented and corrective actions implemented.

Personnel assigned to quality assurance functions will have the responsibility to issue and control Corrective Action Request (CAR) Forms (Figure 8.1). The CAR identifies the out-of-compliance condition, reference document(s), and recommended corrective action(s) to be administered. The project manager will maintain the log for status of CARs, confirm the adequacy of the intended corrective action, and verify its implementation. CARs will be retained in the project file for the records.

Sampling personnel are responsible for documenting, numbering, logging and verifying proper sampling procedures. The project manager will be responsible for ensuring that all recommended corrective actions are implemented, documented, and approved.

Figure 8.1

CORRECTIVE ACTION REQUEST

Number_____ Date_____

TO_____.

You are hereby requested to take corrective actions indicated below and as otherwise determined by you (A) to resolve the noted condition and (B) to prevent it from recurring. Your written response is to be returned to the project quality assurance manager by_____.

CONDITION:

REFERENCE DOCUMENTS:

RECOMMENDED CORRECTIVE ACTIONS:

ORIGINATOR	DATE	APPROVAL	DATE	APPROVAL	DATE

RESPONSE

CAUSE OF CONDITION:

CORRECTIVE ACTION

(A) RESOLUTION

(B1) PREVENTION

(B2) AFFECTED DOCUMENTS

SIGNATURE_____ DATE_____

C.A. FOLLOWUP:

CORRECTIVE ACTION VERIFIED: BY_____ DATE_____

ENGINEERING-SCIENCE

SECTION 9

REFERENCES

Air National Guard Site Investigation Protocol Document.

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APPENDIX D

CONTINGENCY PLAN

FINAL

APPENDIX D
ANG/CEVR
INSTALLATION RESTORATION PROGRAM
CONTINGENCY PLAN

Prepared For:

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DECEMBER 1997

APPENDIX D
TABLE OF CONTENTS

LIST OF TABLES

APPENDIX D

CONTINGENCY PLAN

SECTION 1 - GENERAL

The function of the Contingency Plan is to set procedures for organizing, planning, and coordinating various groups and services in the event of an emergency during the site remediation. The plan discusses protocol for notifying key participants, taking remedial actions, and ensuring worker and community safety. The Contingency Plan is divided into the following sections:

- Listing of telephone numbers, addresses, and contact persons that provide emergency services (Section 2).
- Listing of emergency equipment to be stored on site (Section 3).
- Evacuation Plan (Section 4).
- Site-specific emergency procedures and remedial options (Section 5).
- Emergency Prevention (Section 6).

SECTION 2 - EMERGENCY SERVICES

Emergency situations may require decisions to be made by individuals not present at the site, assistance from outside, trained help, or notification of employers or regulatory agencies. A listing of personnel and phone numbers will be posted at the site in the site trailers.

The following is a list of telephone numbers and addresses for agencies and organizations to be contacted for emergency services:

Organization	Address/Contract Person
ANG	Mr. Winston Crow ANG/CEVR 3500 Fetchet Avenue Andrews AFB, MA 20762-5157 (301) 836-8155
PaANG	Major Renee Tatro 193 SOW/EM 620 Olmsted Boulevard Middletown, PA 17057-5062 (717) 948-2259

Organization	Address/Contract Person
Engineer	Mr. Edward Roberts Parsons Engineering Science, Inc. 290 Elwood Davis Road Liverpool, NY 13088 (315) 451-9560 Fax: (315) 451-9570
Contractor	To be determined
Site Facilities	Master Sergeant James Koshute 112th Tactical Control Squadron (TCS) State College ANGs 551 Bigler Road Ext. State College, PA 16803-6799 (814) 237-3004
PADEP	Mr. Randy Farmerie, P.G. PADEP Hazardous Sites Section Environmental Cleanup Program 208 W. Third Street, Suite 101 Williamsport, PA 17701-6448 (717) 327-3716
PADEP Spill Hotline	1-800-457-7362
PA One Call System, Inc.	1-800-242-1766
Pollution Toxic Chemical Oil Spills	1-800-424-8802
UFPO	1-800-962-7962
Local Police Department	911
County Police Department	911
State Policy Department	911
Fire Department	911
Poison Control Center	1-800-521-6110

Organization	Address/Contract Person
Hospital	Center Community Hospital 1800 East Park Avenue State College, PA 16803 (814) 423-6111, Emergency
Equipment suppliers	To be determined

The above list may be added to or revised as needed.

2.1 COORDINATION OF EMERGENCY SERVICES

Prior to the start of construction activities, the above list of emergency service personnel will be familiarized with the following:

1. The site layout (Design Drawings G-1, C-1, C-2).
2. Associated Hazards of the Site 2 Soil Contaminants. The following additional hazards may be encountered on site: noise and heavy equipment.
3. Facility Evacuation Plan (refer to Section 4 of this plan).

SECTION 3 - EMERGENCY EQUIPMENT

The following is a general list of emergency equipment, equipment capabilities, and equipment storage locations.

Equipment	Locations	Capabilities
Hand-held fire extinguishers	Support area on machinery	Extinguish small fires
First aid kits	Support area	Perform first aid for minor injuries
Spill kit	Support area	To clean small incident spills
Extra silt fence	Excavation area	To contain areas of erosion
Emergency eye wash station	Perimeter of exclusion zone	Clean foreign objects/ chemicals from eyes
Air horn	Support area	Alarm notification

SECTION 4 - EVACUATION PLAN

The site construction manager will have primary responsibility for establishing whether evacuation of the site is necessary. Evacuation of specific areas due to immediate health or safety dangers will be established by personnel present. The following standard hand signals will be used in case of inability for voice communication:

Hand gripping throat ..... Out of air; can't breath
Grip partner's wrist or both hands around waist ..... Leave area immediately
Hands on top of head..... Need assistance
Thumbs up ..... OK; I am all right; I understand
Thumbs down..... No; negative

If an emergency situation poses significant danger to personal safety, the following evacuation plan should be initiated as time permits.

1. Site personnel shall be alerted to potential problems. An alarm system, such as three long blasts from an air horn, should be established, documented, and reviewed with site personnel by the site construction manager.
2. Site equipment should be shut down.
3. Site personnel should proceed to the contamination reduction zone, then to the support zone.
4. Appropriate emergency response agencies should be notified (Section 2).

SECTION 5 - SITE-SPECIFIC EMERGENCY PROCEDURES AND OPTIONS

5.1 PERSONNEL AND EQUIPMENT SAFETY

A. Procedures.

1. Set safety practices and standards for each operation at the site.
2. Train site personnel.
3. Inform site construction manager of non-conformance.

B. Possible Actions.

Actions	Function
Follow OSHA safety requirements.	Provide a safe working environment.
Follow equipment and safety suggestions on Table 5-1.	Provide a safe working environment.

TABLE 5-1

SAFETY SUGGESTIONS FOR EQUIPMENT OPERATORS

1. Check equipment before starting.
2. Use steps and handholds.
3. Keep steps clean.
4. Inspect area before moving.
5. Operate from driver's seat.
6. Wear seat belts.
7. Never mount moving equipment.
8. Authorized passengers only.
9. Keep bucket or blade low.
10. Check blind areas.
11. Keep enough clearance.
12. Avoid sidehill travel.
13. Avoid excessive speed.
14. Do not crush sealed containers.
15. Go carefully over bulky items.
16. Check work area.
17. Park on level ground.
18. Lower attachments to ground when parked.
19. Never jump from equipment.
20. Avoid leaving equipment unattended.
21. Always have adequate lighting.
22. Clean equipment before repairing.
23. Remain in seat during equipment adjustments.
24. Wear hearing protectors.
25. Wear steel-toed boots.
26. Wear protective eye wear.

Source: 40 Code of Federal Regulations §271.7.

5.2 ONSITE PERSONAL INJURY

A. Procedures.

1. Provide first aid for minor injury.
2. Notify ambulance.
3. Notify hospital.
4. Notify PaANG.
5. Document accident through completion of an Accident Report Form.

B. Possible Actions.

Actions	Function
Identify unsafe conditions and revise.	Provide a safe working environment.
Follow OSHA safety requirements.	Provide a safe working environment.
Follow site operation requirements.	Provide a safe working environment.

5.3 FIRES

A. Procedures

1. Extinguish immediately (if small fire).
2. Signal evacuation procedure, isolate area, and remove personnel to an upwind location.
3. Notify Fire Department.
4. Notify PaANG.
5. Record incident.

B. Possible Actions.

Actions	Function
Extinguish fire.	Smothers fire.

5.4 EQUIPMENT BREAKDOWN

A. Procedures

1. Notify mechanic.
2. Notify PaANG.
3. Notify equipment supplier.
4. Evaluate repair or replacement alternatives.

5. Implement best remedial option(s).

B. Possible Actions.

Actions	Function
Establish and implement proper equipment maintenance program.	Reduce equipment downtime.
Replace or repair equipment.	Reduce equipment downtime.
Identify cause of repeated problem and remediate.	Reduce equipment downtime.

5.5 WASTEWATER (DECON WATERS, EXCAVATION DEWATERING FOLLOWING PRECIPITATION) STORAGE TANK SPILL OR LEAKAGE

A. Procedures

1. Shut off pumps to storage tank.
2. Check that valves to tank are closed.
3. Notify PaANG.
4. Notify Construction Manager.
5. Evaluate tank repair options.
6. Evaluate remediation alternatives for spilled wastewater.
7. Formulate repair and remedial action plan.
8. Implement plan.

B. Possible Actions.

Actions	Function
Repair any tank breakage.	Stop spill or leakage.
Pump water out of the tank into another tank.	Prevents further leakage of wastewater from the damaged tank.
Contain spill.	Secure spill.
Excavate contaminated soil.	Remediates contaminated soil.

5.6 GENERAL SPILLS

A. Procedures.

1. Cease filling operations in the spill area.
2. Isolate the spill area.
3. Evacuate the area where the spill has occurred.
4. Notify PaANG.
5. Notify PADEP.
6. Begin spill cleanup procedures.

B. Possible Actions.

Actions	Function
Contain spill.	Secure spill.
Excavate contaminated soils.	Removes contaminated soils.

5.7 EXCEEDANCE OF PARTICULATE ACTION LEVEL

A. Procedures

1. Suspend site operations.
2. Notify PaANG.
3. Notify PADEP.

B. Possible Actions.

Actions	Function
Apply water on haul road.	Control dust.
Wet equipment and excavation faces.	Control dust.
Spray water on buckets during excavation and dumping.	Control dust.
Haul materials with tarped containers.	Control dust.
Restrict vehicle speed to 10 mph.	Control dust.
Cover excavation area after excavation activities cease.	Control dust.
Reduce excavation size and/or number of excavations.	Control dust.

SECTION 6 - EMERGENCY PREVENTION

6.1 PREVENTION

As a preventative measure, the site construction manager will make frequent visual observations of storage tanks, pipes, hoses, loading and unloading waste areas, handling areas and storage areas. Also, the site construction manager will make a daily inspection of :

- pipes, pumps, valves, fittings, and tanks for leaks;
- areas around tanks for evidence of spilled materials;
- housekeeping practices;
- chemical containers for damage;
- integrity of erosion and sedimentation controls (e.g. silt fences);
- waste storage, treatment, or disposal sites for leaks, seeps, and overflows; and
- emergency equipment.

6.2 PREVENTIVE MAINTENANCE

The site construction manager will immediately repair, adjust, or replace equipment showing signs of potential failure. All equipment will be properly maintained and serviced on a regular basis in accordance with manufacturer's recommendations.

6.3 HOUSEKEEPING PROGRAM

Due to the deficiency of open space and the proximity of site features, improperly or precariously placed materials may be unsafe to site personnel or may obstruct evacuation routes. The construction manager is responsible for keeping materials in their proper locations and, in general, maintaining site order and cleanliness. In addition, the site will be kept free from obstructions, trash, and debris.

6.4 SECURITY

Access to the exclusion zone will be restricted to persons having read the site-specific Health and Safety Plan and having attended a safety indoctrination meeting. Signs will be posted at the entrance to the site, stating, "DANGER - AUTHORIZED PERSONNEL ONLY - PROTECTIVE EQUIPMENT REQUIRED BEYOND THIS POINT." Access to the work area will be limited to personnel who must perform specific tasks within the area. Visitors will be escorted by the site construction manager.

The site will be kept secure by a combination of existing and temporary fencing. Whenever personnel are to be absent from the site for extended periods or overnight, the site construction manager will secure the site by closing the temporary fencing.

The site construction manager will verify that every person entering the exclusion zone has read and signed the site-specific Health and Safety Plan and familiarized themselves with all potential hazards associated with the site. Also, the individuals must have successfully completed an OSHA 40-hour training course to be allowed into the exclusion zone. No person may enter the exclusion zone without the site construction manager's knowledge and authorization.

6.5 EMPLOYEE TRAINING PROGRAM

An initial safety meeting and training session, as outlined in the site Health and Safety Plan, will be attended by all employees working at the site involved with the remedial action. The meeting will be run by the Contractor Safety Officer and will address pertinent issues associated with the remediation and the Health and Safety Plan. The following items will be covered:

- hazards associated with Site 2 contaminants (refer to Health and Safety Plan);
- dangers and indications of cold stress;
- dangers and indications of heat stress;
- location of hospital and maps to hospital;
- location of emergency contact names and phone numbers;
- location of first aid kit and its contents;
- proper dress and personal protective equipment required for onsite work;
- dangers associated with working around heavy equipment;
- decontamination procedures;
- water storage system operation;
- component maintenance;
- contingency procedures; and
- spill response procedures.

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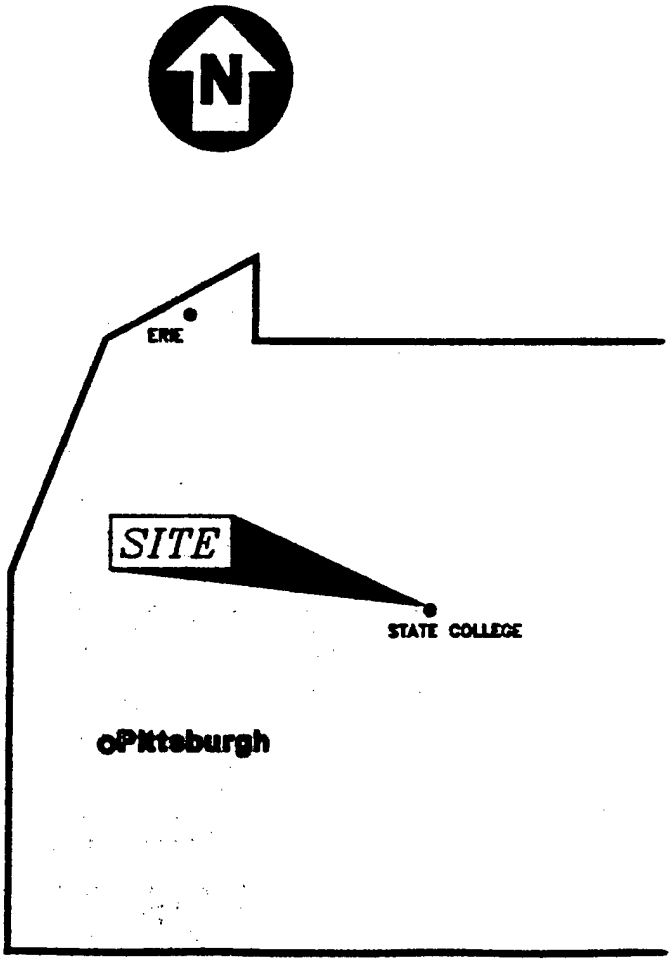
ARSONS NGINEERING CIENCE, INC. VERPOOL, N.Y. 15) 451-9560	Issue Certification NOT FOR CONSTRUCTION	Job No. 730472 Designed EWR Drawn JTS Checked Reviewed Approved Reg. No. Date			
			C	12/19/97	ISSUED FOR BIDDING
			B	12/5/97	ISSUED FOR FINAL REVIEW
			A	11/7/97	ISSUED FOR REVIEW
			Rev	Date	Description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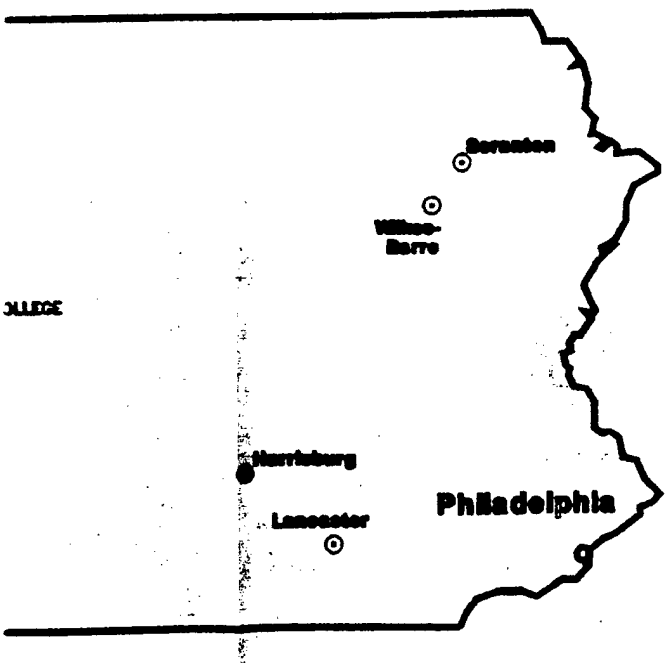

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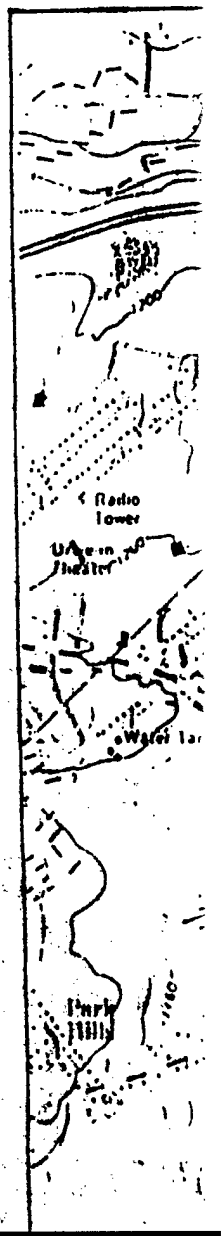

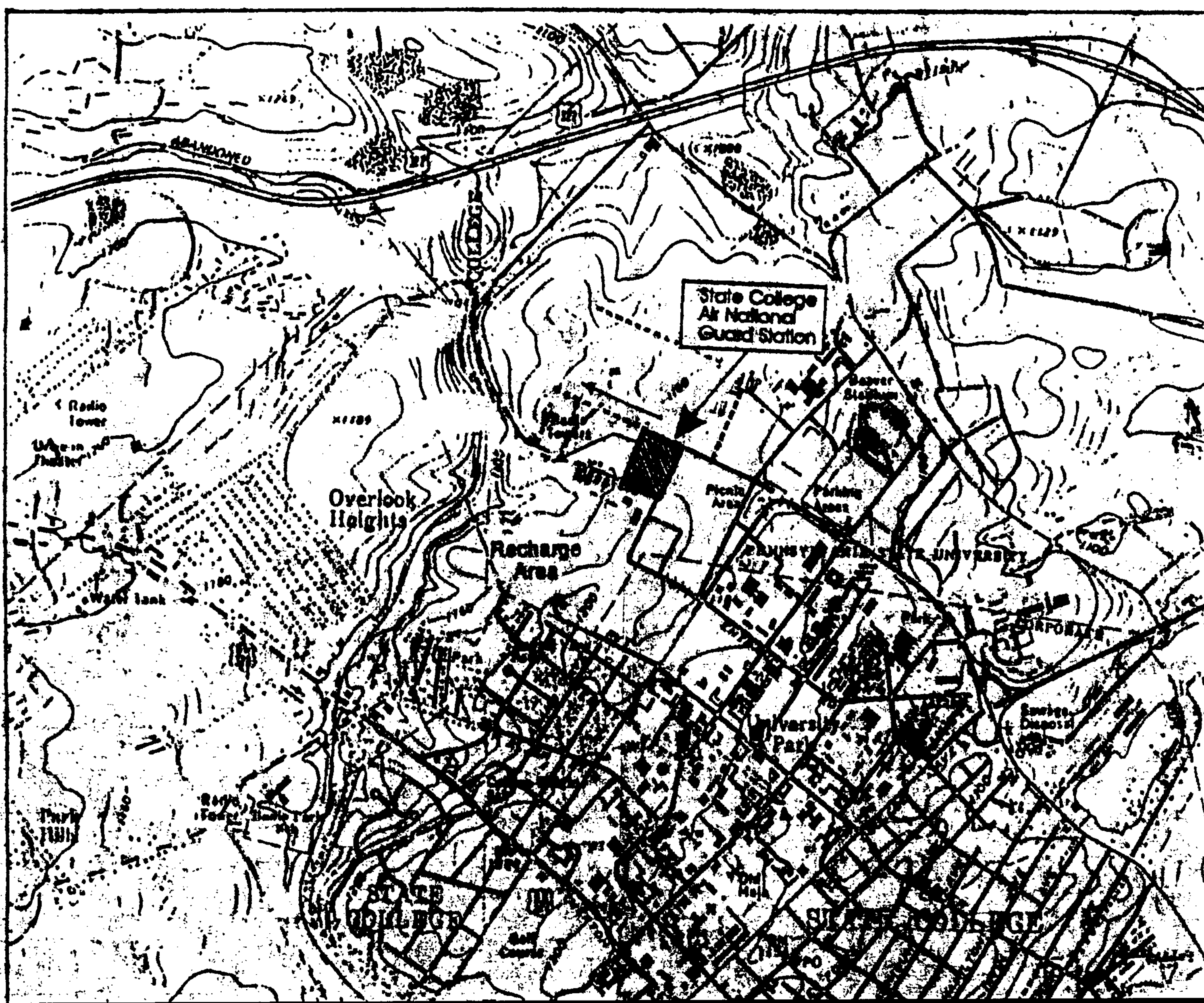
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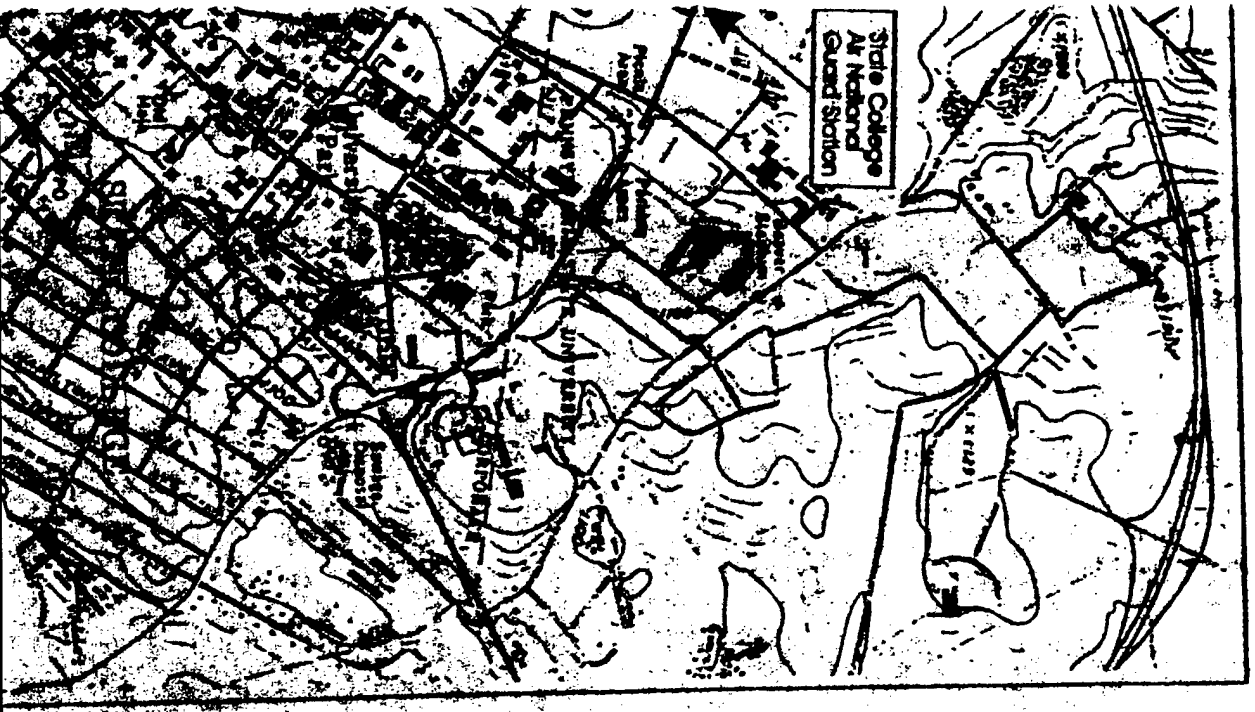

(10)

PaANG STATE COLLEGE
SITE 2 REMOVAL ACTION DESIGN

SHEET AND DRAWING INDEX

ANG/CEVR
3500 FETCHET AVENUE
ANDREWS AFB, MD 20762

PARSONS
ENGINEERING
SCIENCE, INC.

LIVERPOOL, N.Y.
(315) 451-9560

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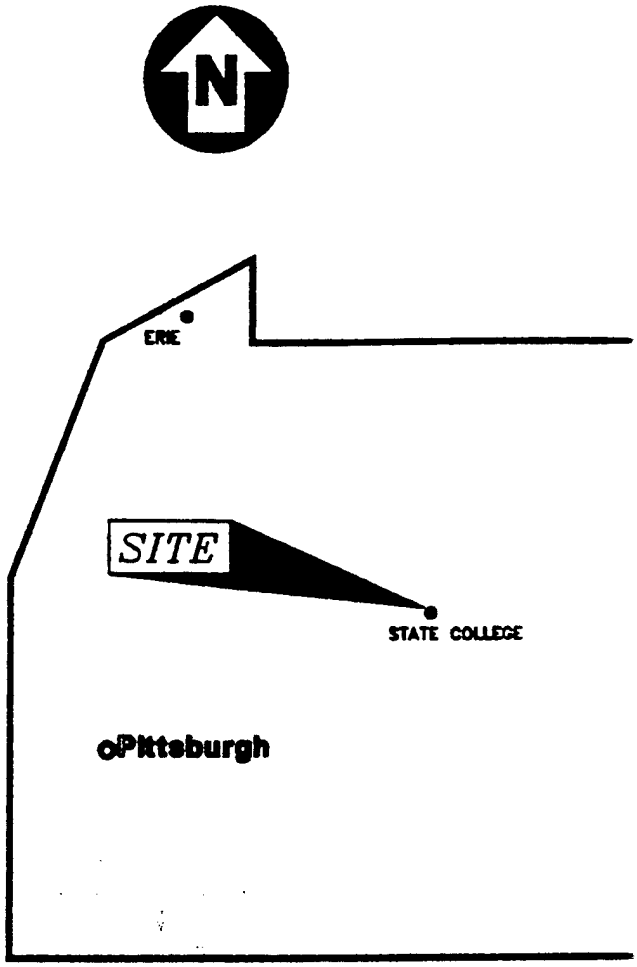

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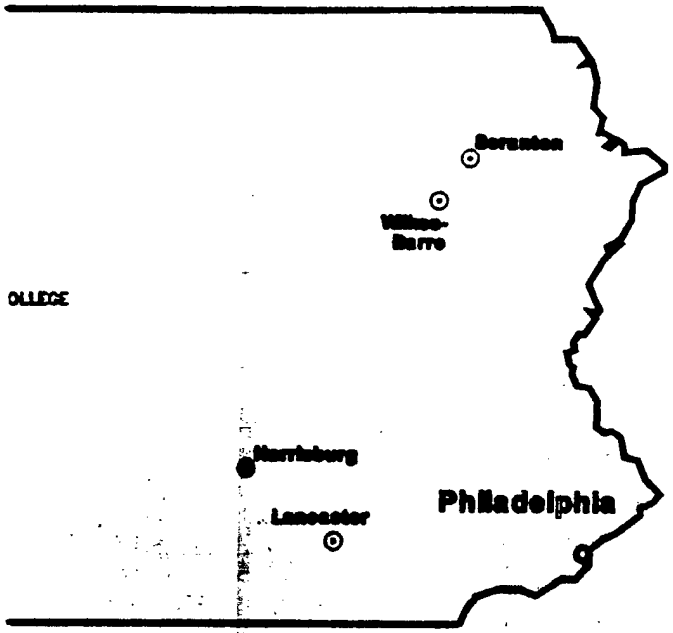

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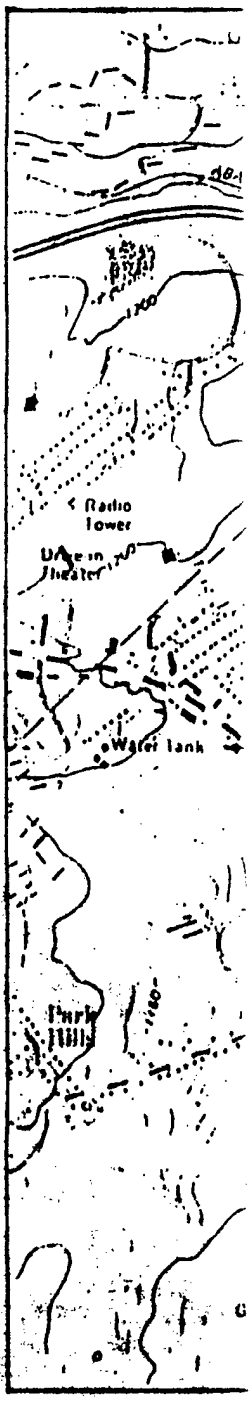
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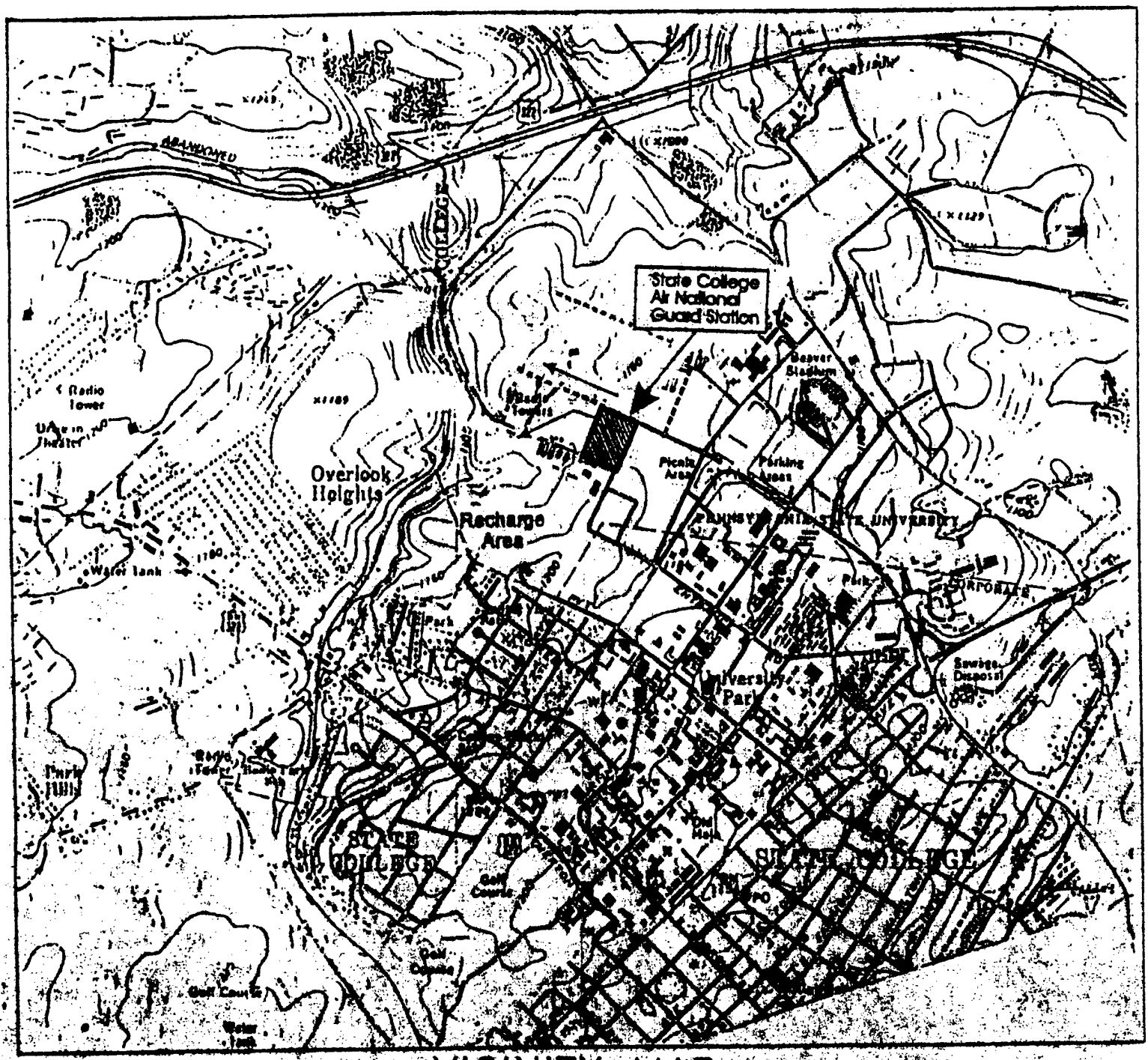
Tower
Water Tank
Park



VICINITY MAP

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PaANG STATE COLLEGE

SITE 2 REMOVAL ACTION DESIGN

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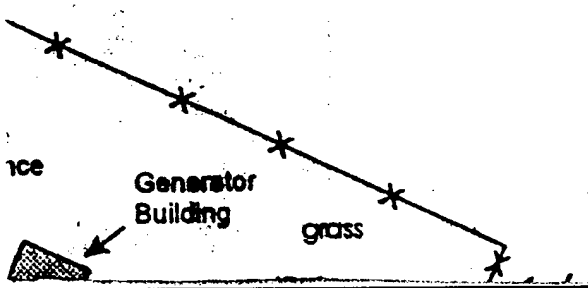
Generator Building


ice
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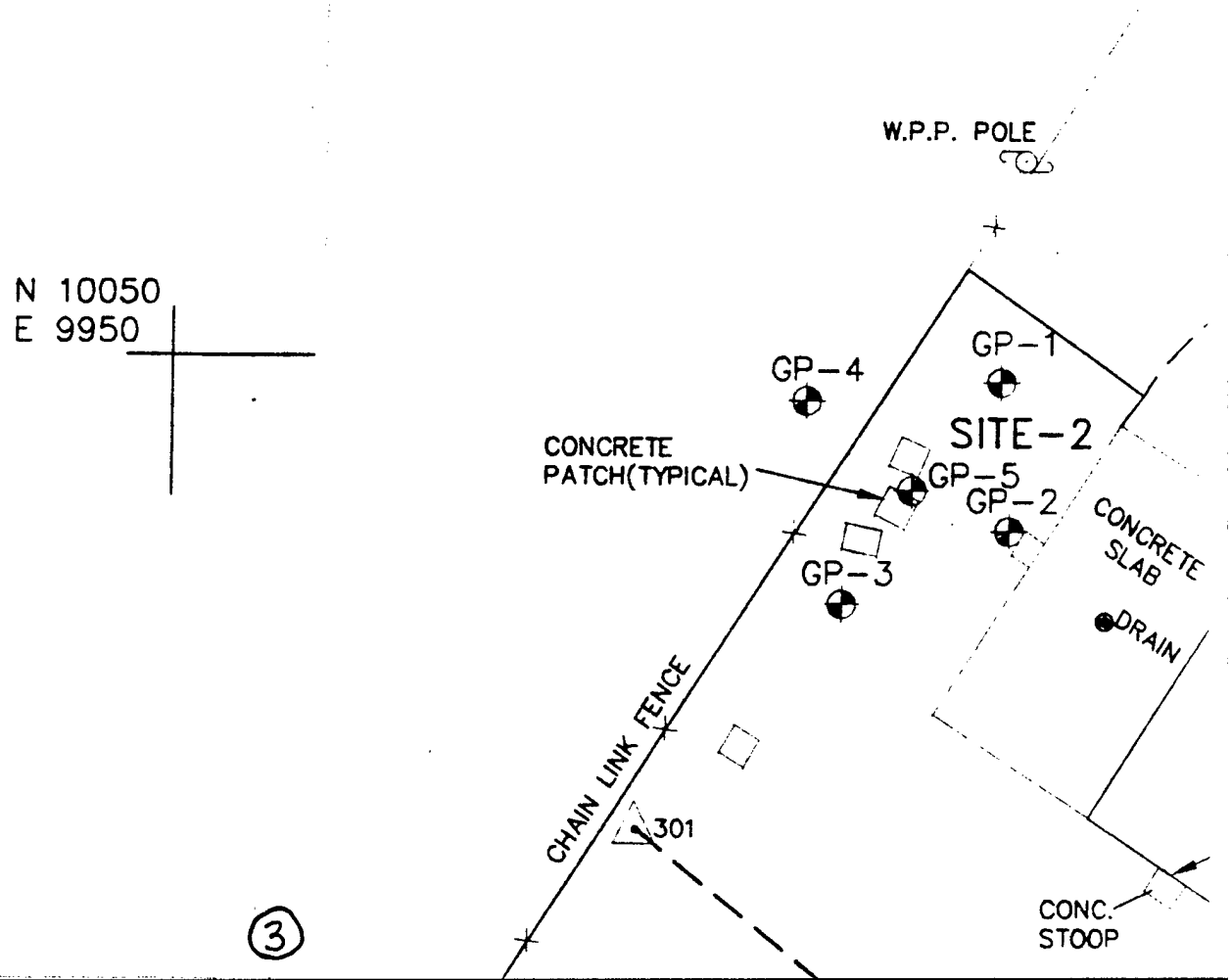
grass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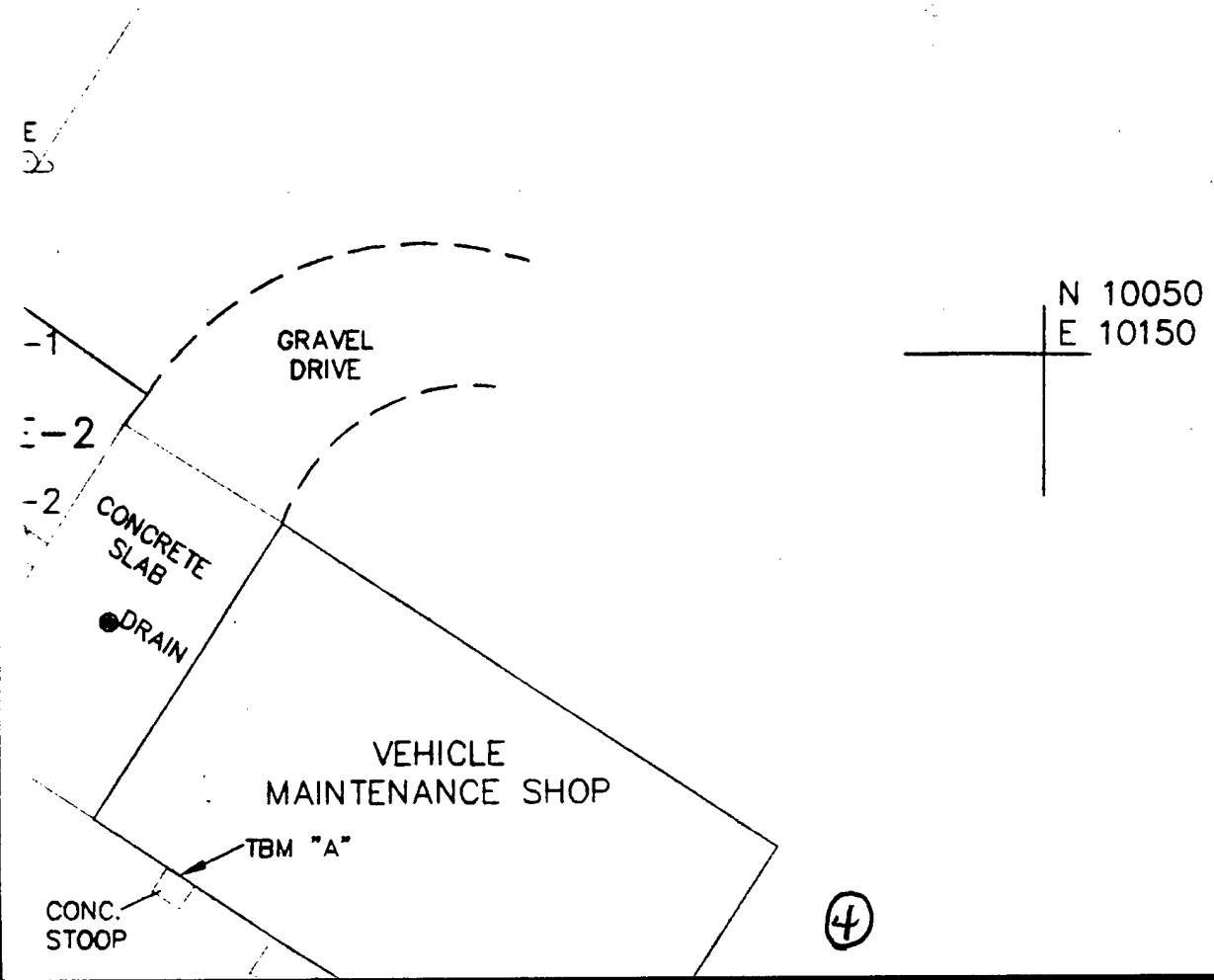
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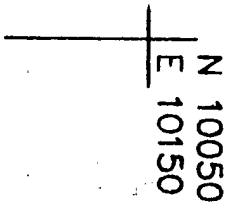

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ARSONS NGINEERING CIENCE, INC. VERPOOL, N.Y. 15) 451-9560	Issue Certification NOT FOR CONSTRUCTION	Job No. 730472 Designed EWR Drawn JTS Checked Reviewed Approved Reg. No. Date			
			C	12/9/97	ISSUED FOR BIDDING
			B	12/5/97	ISSUED FOR FINAL REVIEW
			A	11/7/97	ISSUED FOR REVIEW
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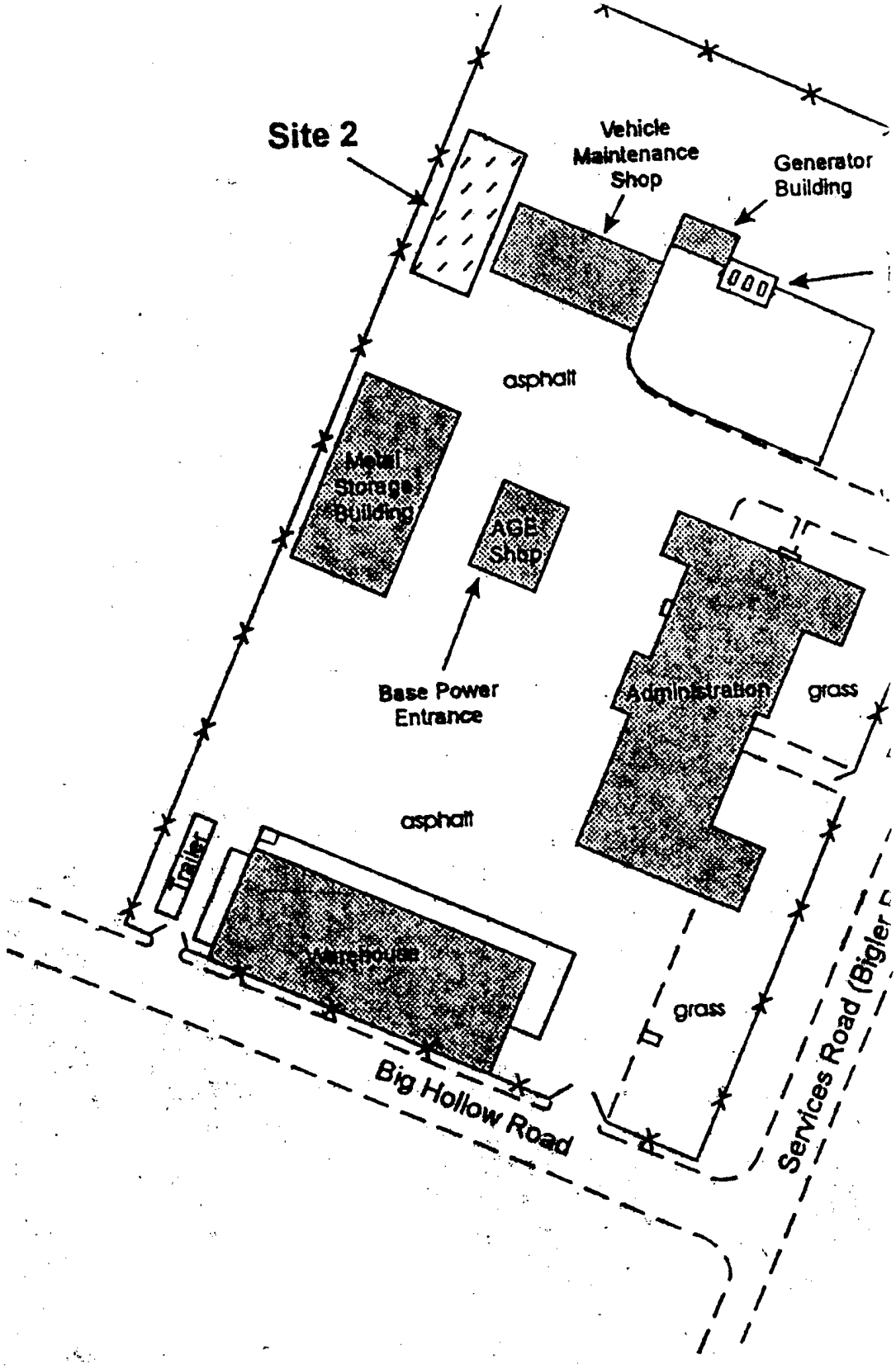

SITE LOCATION MA

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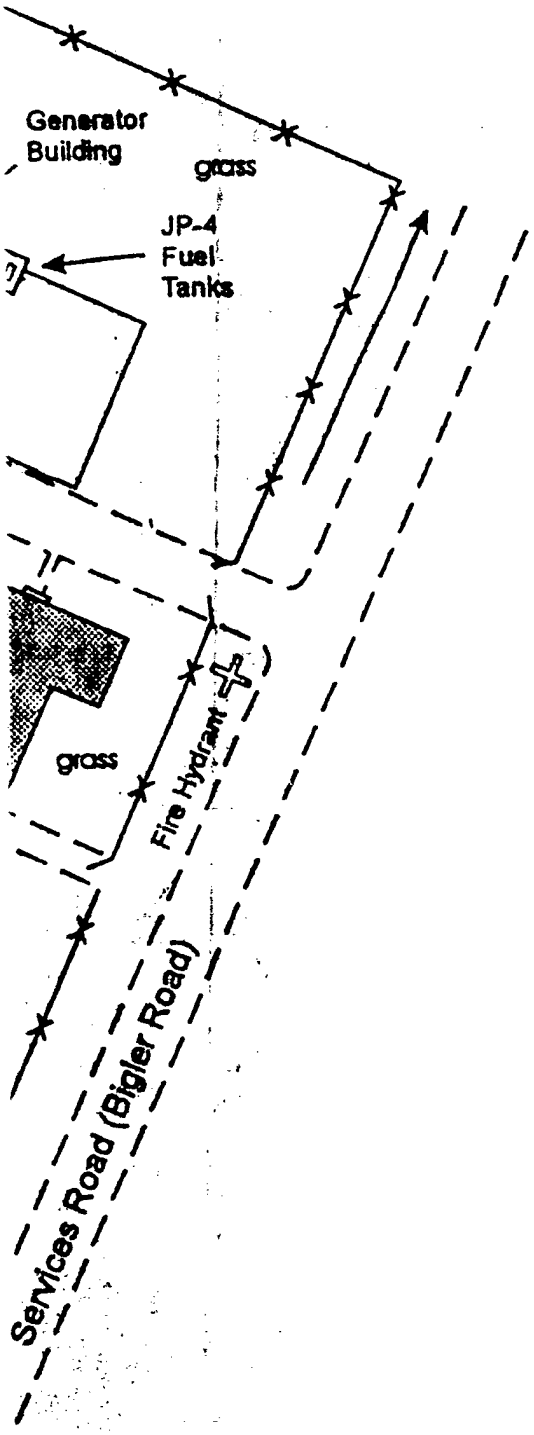
Generator
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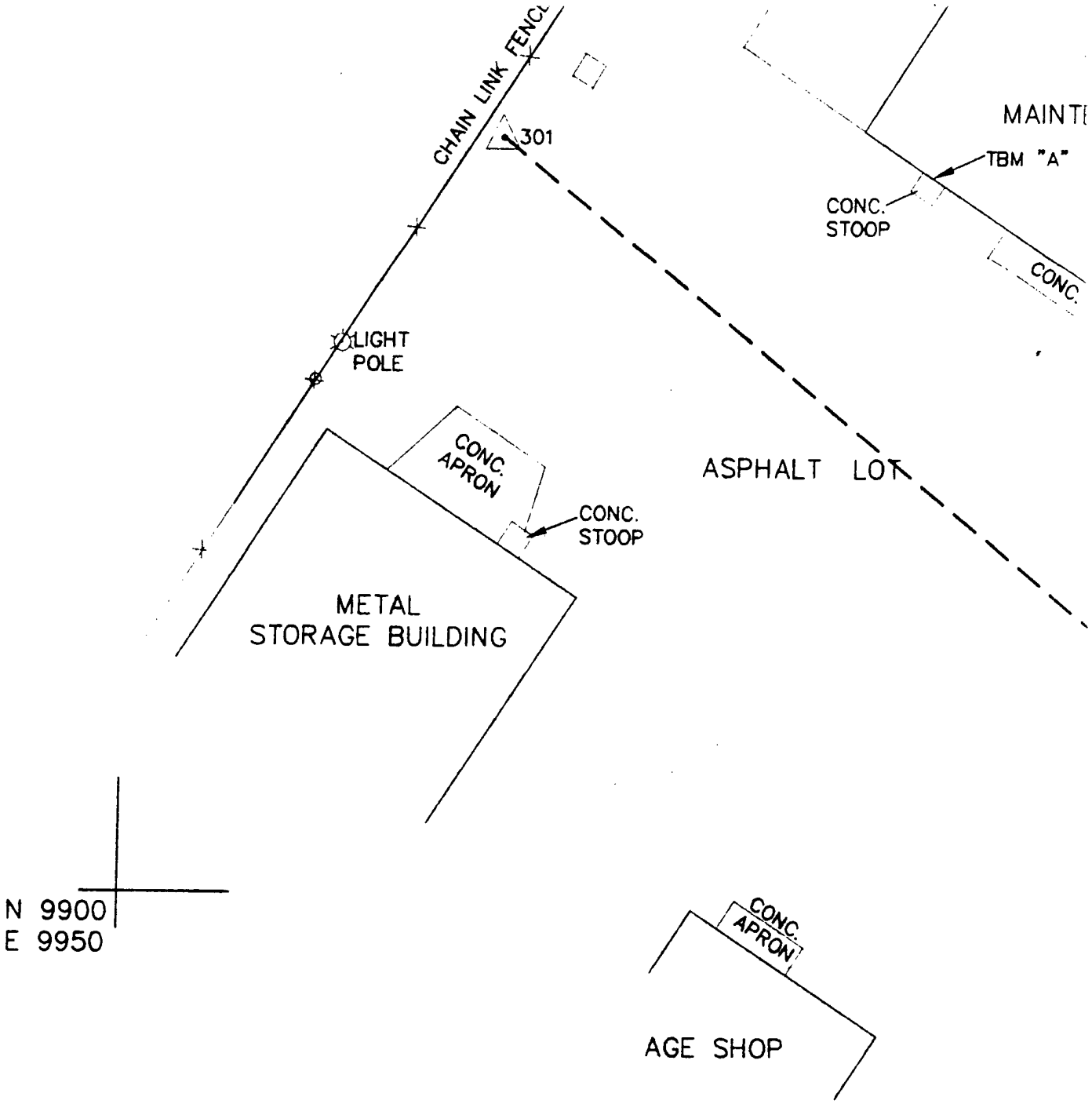
Fuel
Tanks
grass
Fire Hydrant
Services Road (Bigler Road)

N MAP



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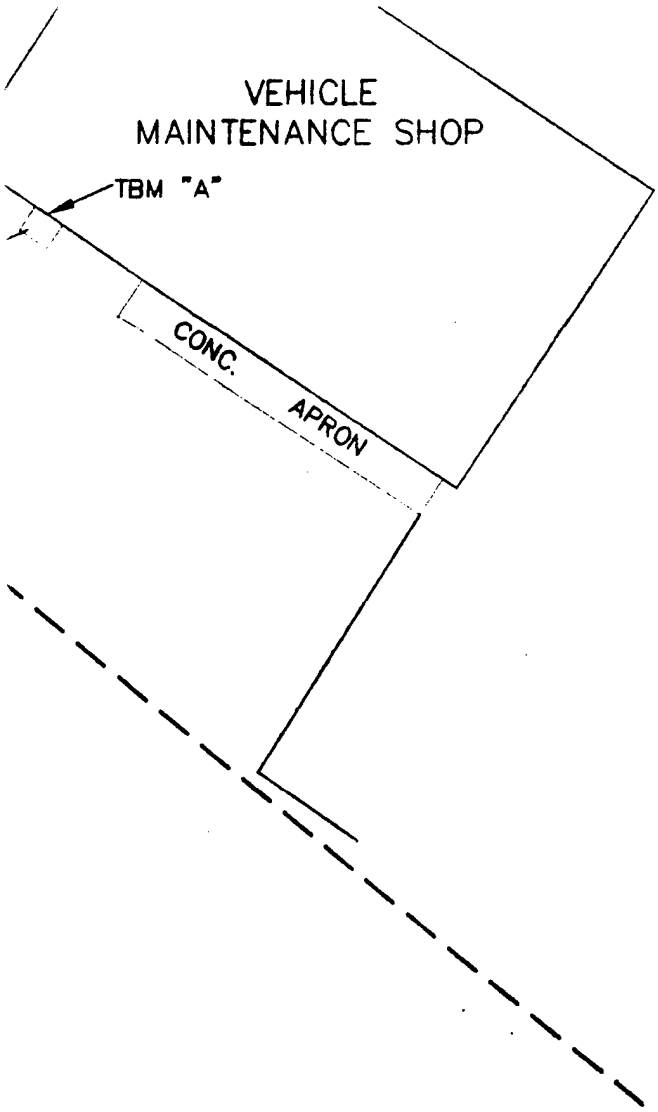

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301 SURVEY LINE

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PLAN

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1997 GEOPROBE BORING AND SAMPLING LOCATION

301 — — SURVEY LINE

FENCE LINE

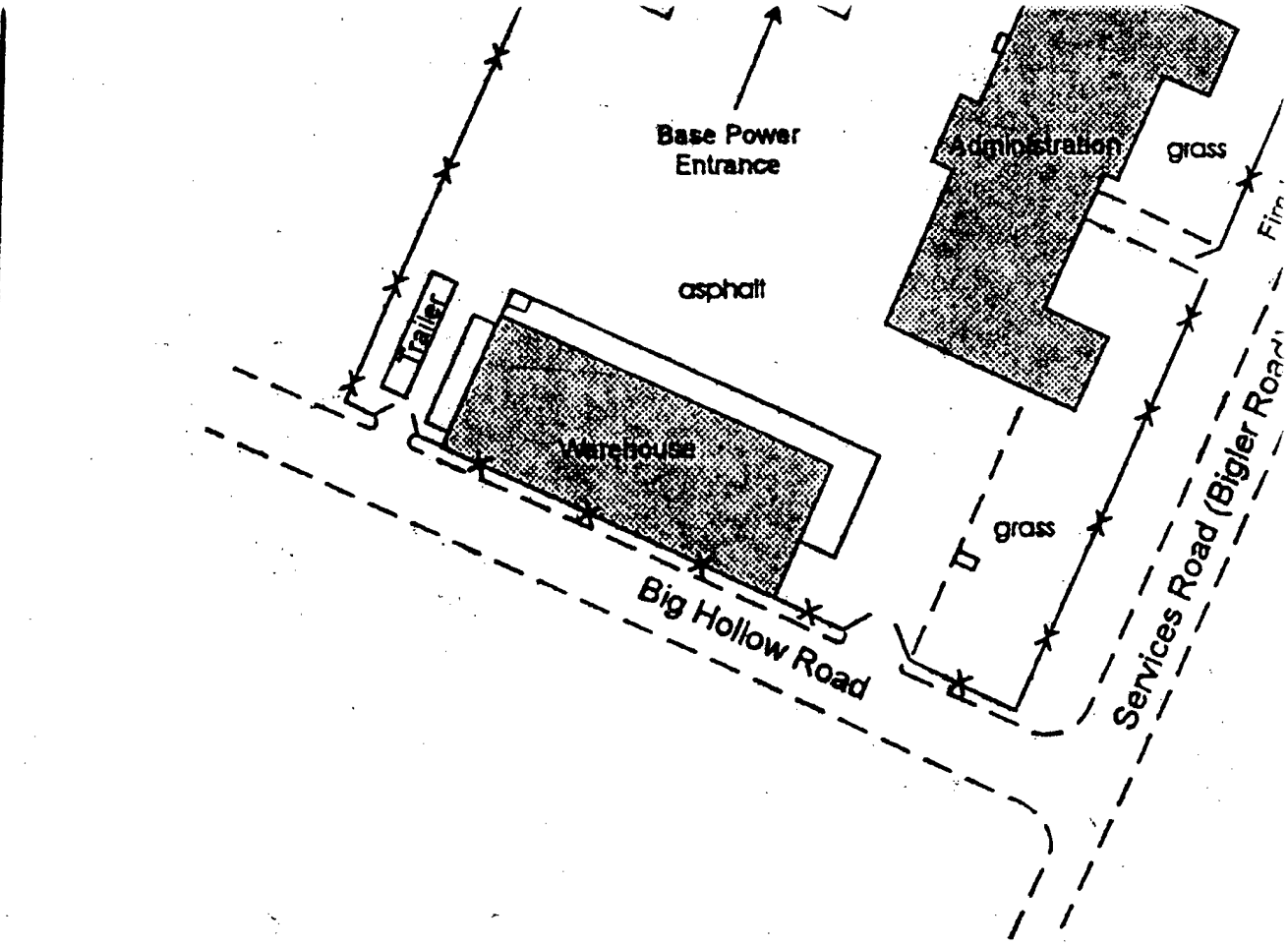
PARSONS ENGINEERING SCIENCE, INC.

LIVERPOOL, N.Y.
(315) 451-9560

ANG/CEVR
3500 FETCHET AVENUE
ANDREWS AFB, MD 20762

PaANG STATE COLLEGE
SITE 2 REMOVAL ACTION DESIGN

EXISTING SITE PLAN AND LOCATION MAP



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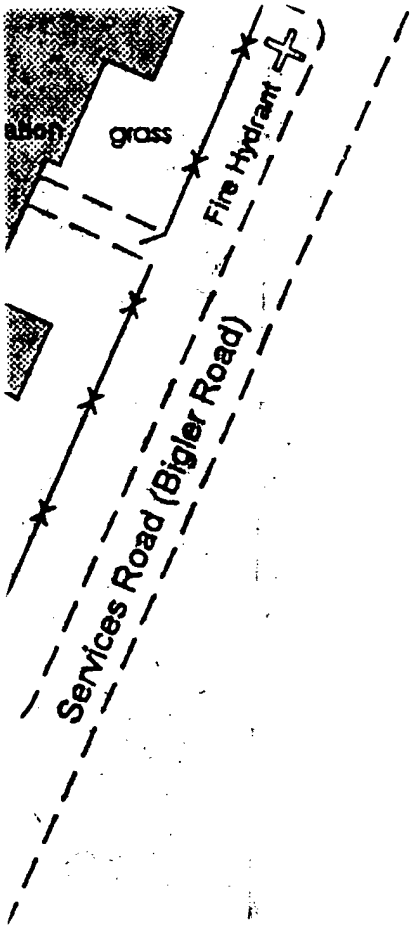

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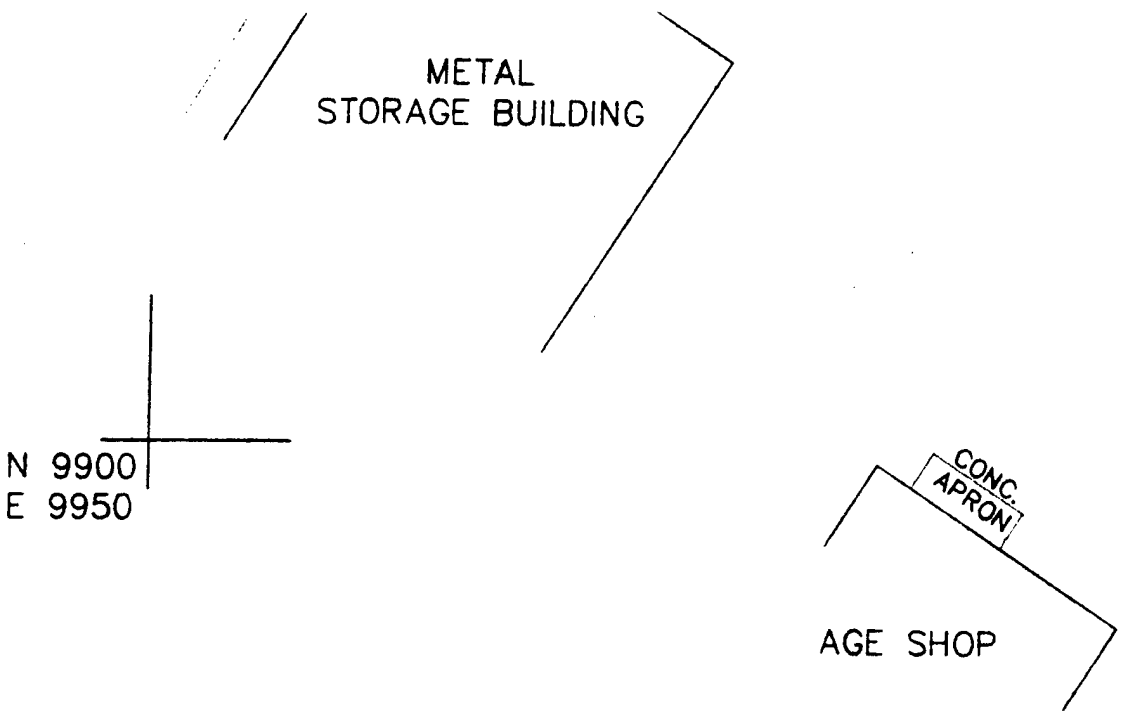

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SURVEY LINE

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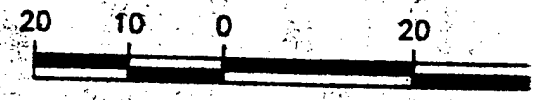

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SITE 2 REMOVAL ACTION DESIGN

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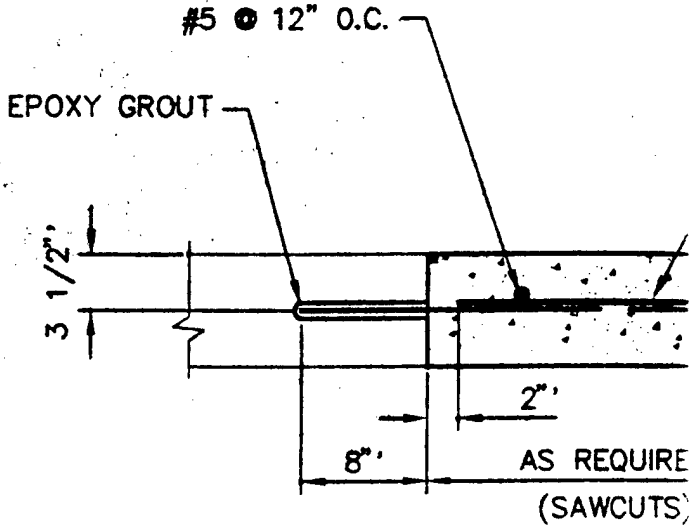

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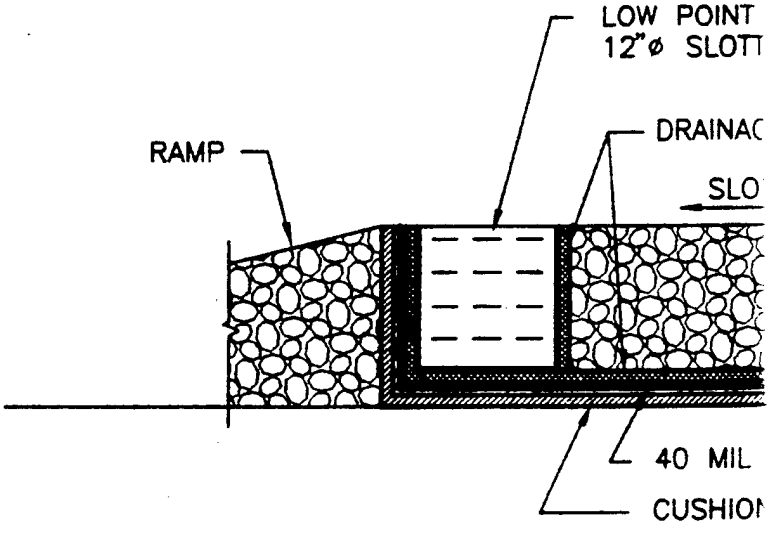

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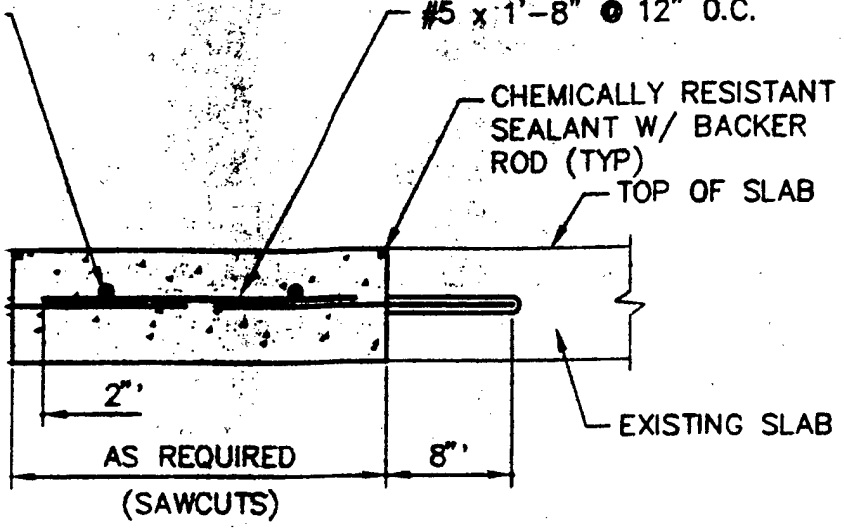
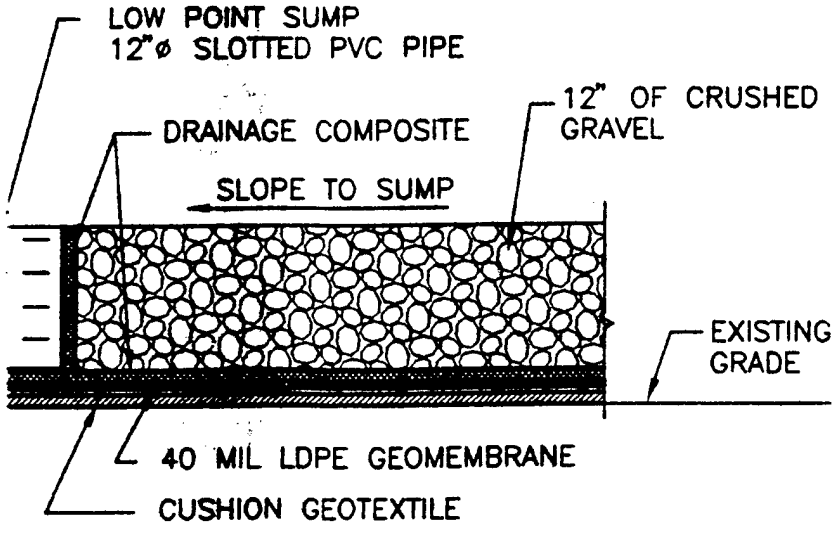


)NCRETE REPAIR DETAIL



CONTAMINATION PAD DETAIL

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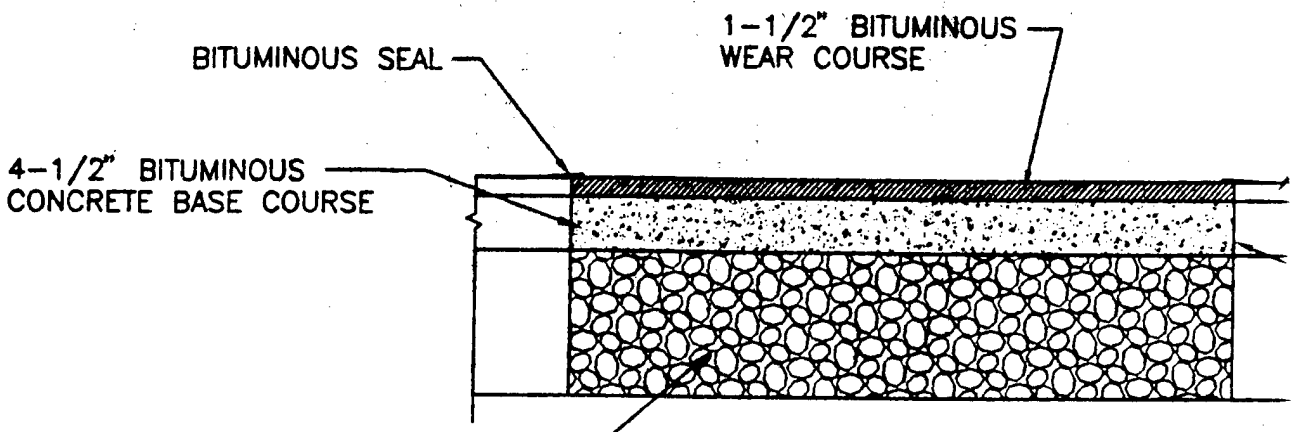

NOTE:

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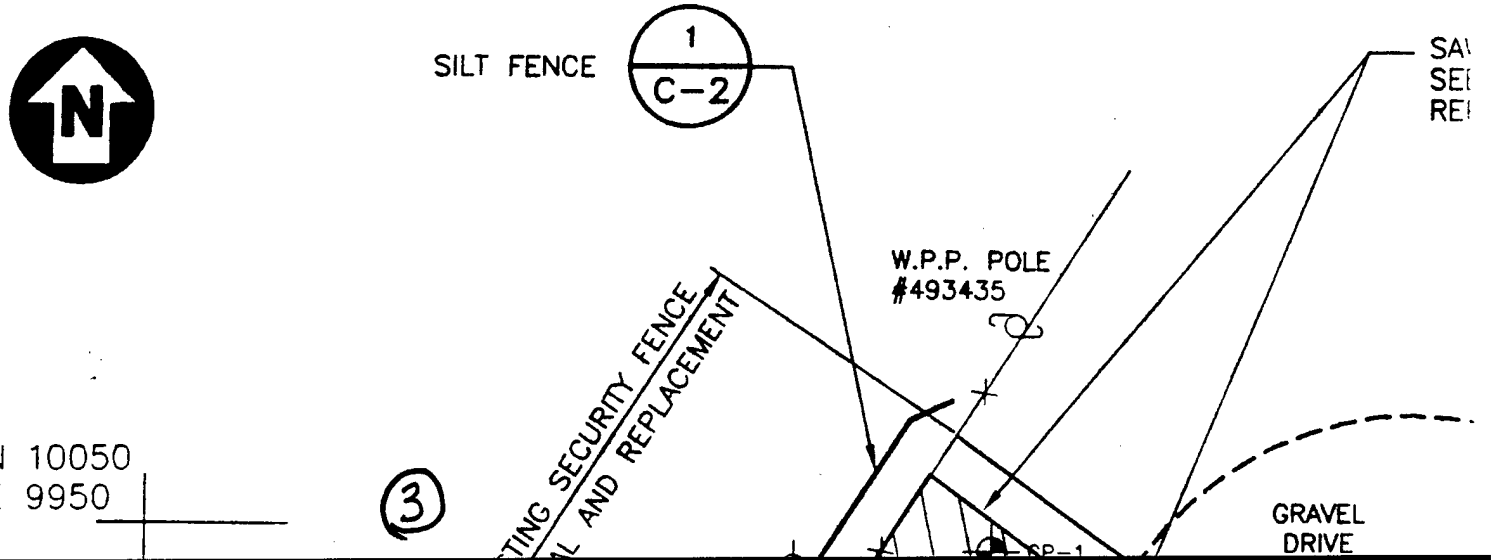

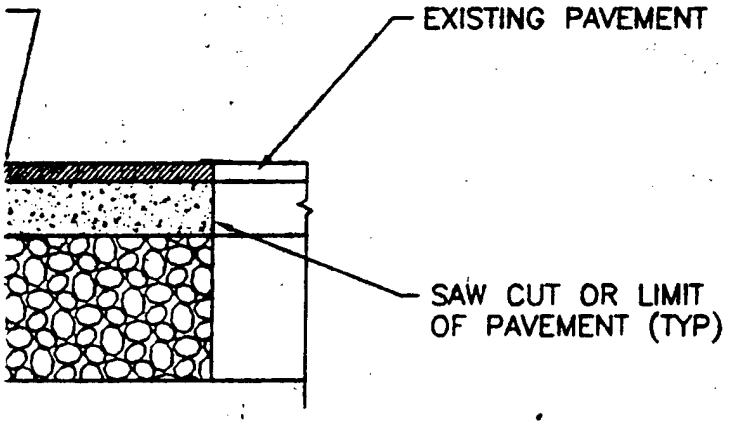

HOWN ARE MINIMUM, MATCH EXISTING
DITIONS IF THE THICKNESS IS GREATER.

AIR DETAIL

NOTES:

1. SURVEY AND STAKE OUT TH
   SEDIMENT EXCAVATION AREA
   SURVEYOR UNDER THE DIRE
2. SITE PREPARATION WILL INCL
   REMOVAL OF ANY EQUIPMEN
   WORK AREA.
3. SAW CUT THE ASHPALT AND
   LIMIT OF EXCAVATION. REM
   CONCRETE FOLLOWED BY DE
4. APPROXIMATE SIZE OF EXCA
   20 FEET BY 35 FEET AND 1
   OF EXCAVATION IS UP TO 1(
   SOIL/SEDIMENT REMOVAL IS
   YARDS.
5. BACKFILL SHALL BE PLACED
   COMPACTED TO 95 PERCENT
   ESTIMATE OF SIX TEST POIN
   TO SUBSEQUENT LIFT PLACE
6. ASPHALT AND CONCRETE WIL
   ESTIMATED PROFILE OF ASPH
   OF 6 INCHES OF ASPHALT/C
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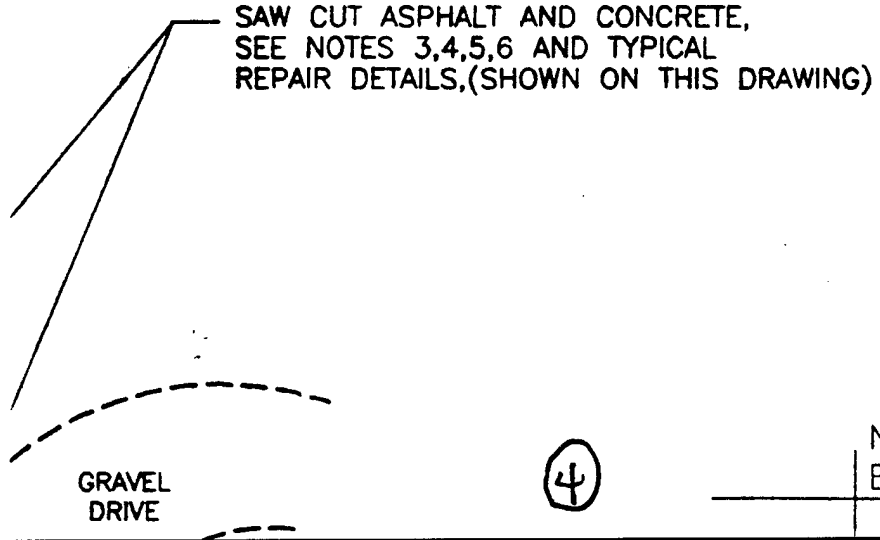
   ALL CUT OUTS SHALL BE PR
   WATER INFILTRATION.



OTES:

1. SURVEY AND STAKE OUT THE LIMITS OF THE SOIL/ SEDIMENT EXCAVATION AREA BY A LICENSED PENNSYLVANIA SURVEYOR UNDER THE DIRECTION OF THE CONTRACTOR.

2. SITE PREPARATION WILL INCLUDE THE CLEARING AND REMOVAL OF ANY EQUIPMENT OR VEHICLES FROM THE WORK AREA.

3. SAW CUT THE ASHPALT AND CONCRETE AT THE DEFINED LIMIT OF EXCAVATION. REMOVE THE ASPHALT AND CONCRETE FOLLOWED BY DEMOLITION AND OFFSITE DISPOSAL.

4. APPROXIMATE SIZE OF EXCAVATION INCLUDES AN AREAS OF 20 FEET BY 35 FEET AND 10 FEET BY 20 FEET. DEPTH OF EXCAVATION IS UP TO 10 FEET. ESTIMATED VOLUME OF SOIL/SEDIMENT REMOVAL IS APPROXIMATELY 340 CUBIC YARDS.

5. BACKFILL SHALL BE PLACED IN 6 INCH LIFTS AND COMPACTED TO 95 PERCENT STANDARD PROCTOR. AN ESTIMATE OF SIX TEST POINTS WILL BE PERFORMED PRIOR TO SUBSEQUENT LIFT PLACEMENT.

6. ASPHALT AND CONCRETE WILL BE REPLACED IN KIND. ESTIMATED PROFILE OF ASPHALT OR CONCRETE CONSISTS OF 6 INCHES OF ASPHALT/CONCRETE UNDERLINED BY 12 INCHES OF GRAVEL SUBBASE (SEE TYPICAL DETAILS) ALL CUT OUTS SHALL BE PROPERLY SEALED TO PREVENT WATER INFILTRATION.

Rev	Date	Description	By
C	12/19/97	ISSUED FOR BIDDING	
B	12/5/97	ISSUED FOR FINAL REVIEW	JTS
A	11/7/97	ISSUED FOR REVIEW	EWR

Job No. 730472
Designed EWR
Drawn JTS
Checked
Reviewed
Approved
Reg. No.
Date

Issue Certification

NOT FOR CONSTRUCTION

ARSONS
NGINEERING
CIENCE, INC.
ERPOOL, N.Y.
5) 451-9560

TYPICAL DECONTAMINA

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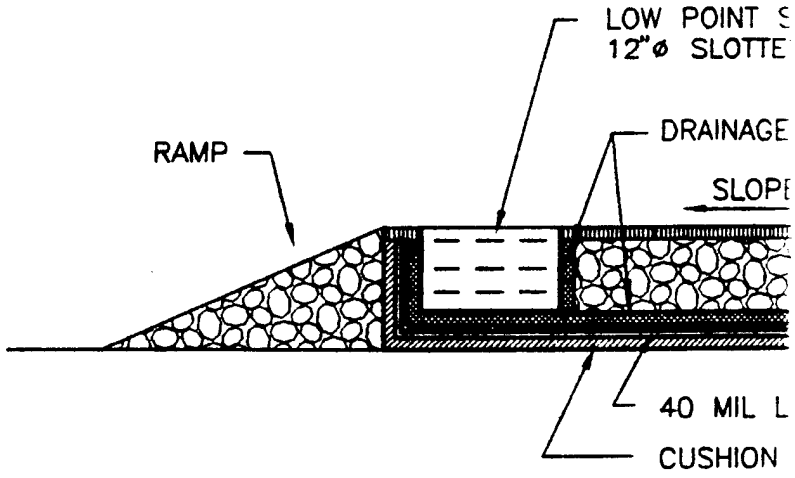
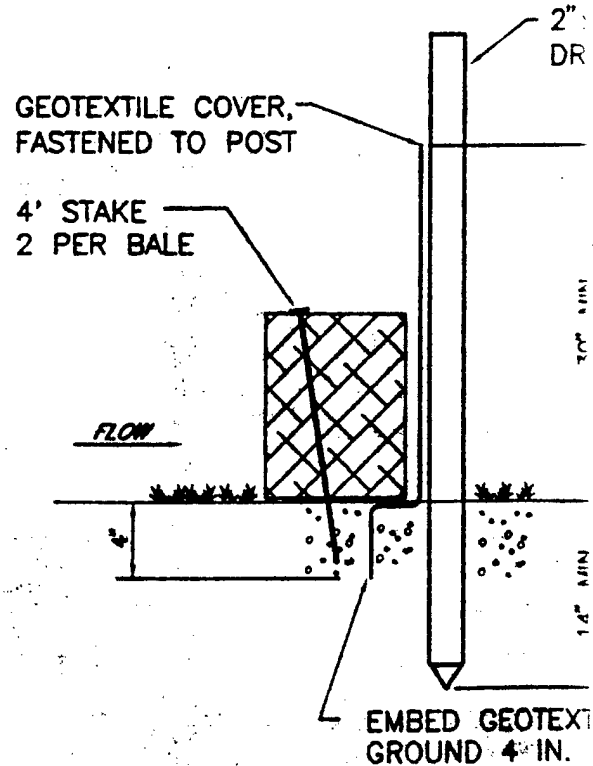
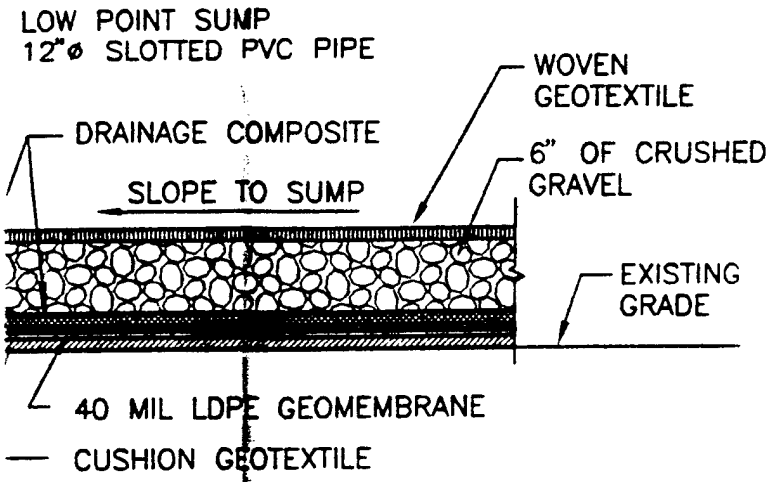


TYPICAL DEWATERING F

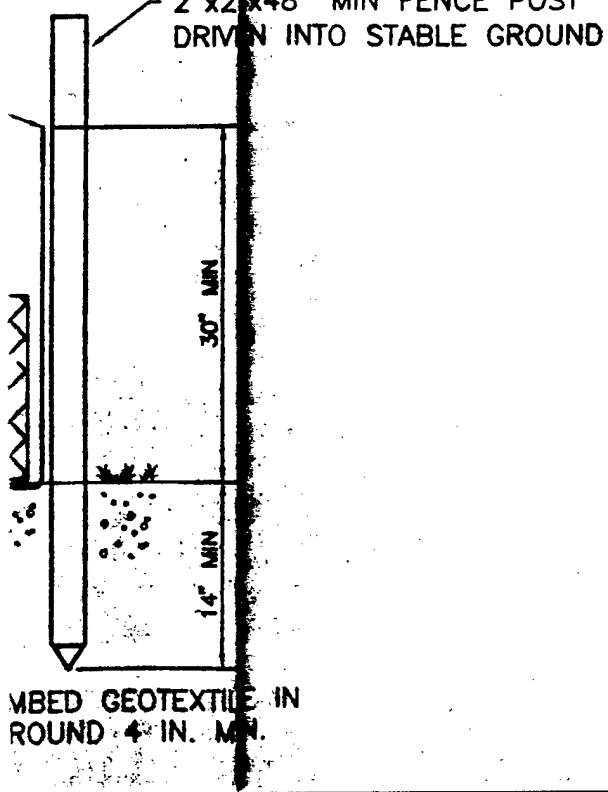
NOT TO SCALE



NAMINATION PAD DETAIL

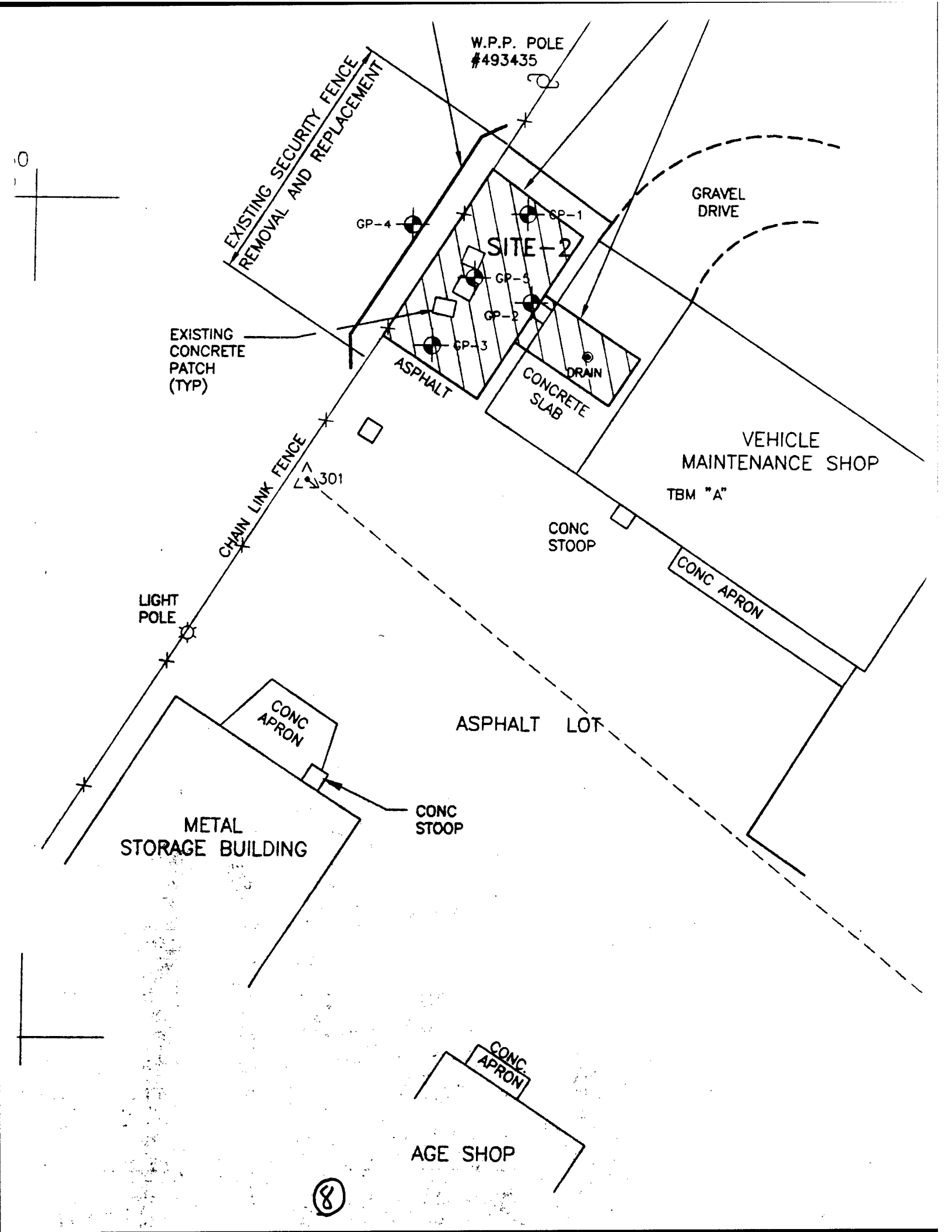


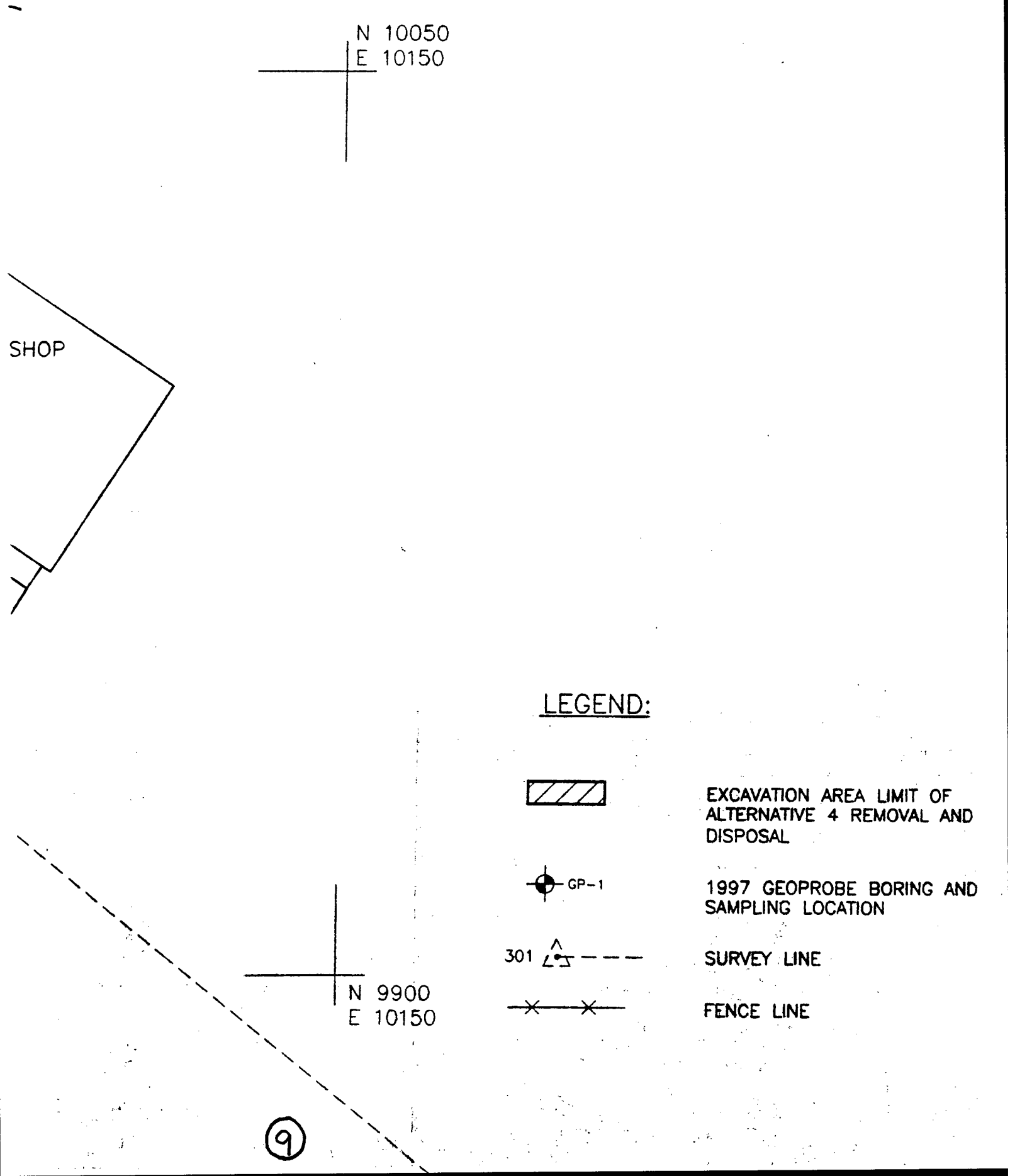
ERING PAD DETAIL



N 10050
E 9950

N 9900
E 9950


W.P.P. POLE
#493435
EXISTING SECURITY FENCE
REMOVAL AND REPLACEMENT
GP-4
GP-1
SITE-2
GP-5
GP-2
GP-3
GRAVEL
DRIVE
EXISTING
CONCRETE
PATCH
(TYP)
ASPHALT
CONCRETE
SLAB
DRAIN
VEHICLE
MAINTENANCE SHOP
TBM "A"
CHAIN LINK FENCE
301
CONC
STOOP
CONC APRON
LIGHT
POLE
CONC
APRON
ASPHALT LOT
CONC
STOOP
METAL
STORAGE BUILDING
CONC.
APRON
AGE SHOP
8


N 10050
E 10150
SHOP
LEGEND:
EXCAVATION AREA LIMIT OF ALTERNATIVE 4 REMOVAL AND DISPOSAL
GP-1
1997 GEOPROBE BORING AND SAMPLING LOCATION
301
SURVEY LINE
FENCE LINE
N 9900
E 10150

LEGEND:

EXCAVATION AREA LIMIT OF ALTERNATIVE 4 REMOVAL AND DISPOSAL

GP-1 — 1997 GEOPROBE BORING AND SAMPLING LOCATION

301 — SURVEY LINE

FENCE LINE

(10)

PARSONS ENGINEERING SCIENCE, INC.
LIVERPOOL, N.Y.
(315) 451-9560

ANG/CEVR
3500 FETCHET AVENUE
ANDREWS AFB, MD 20762

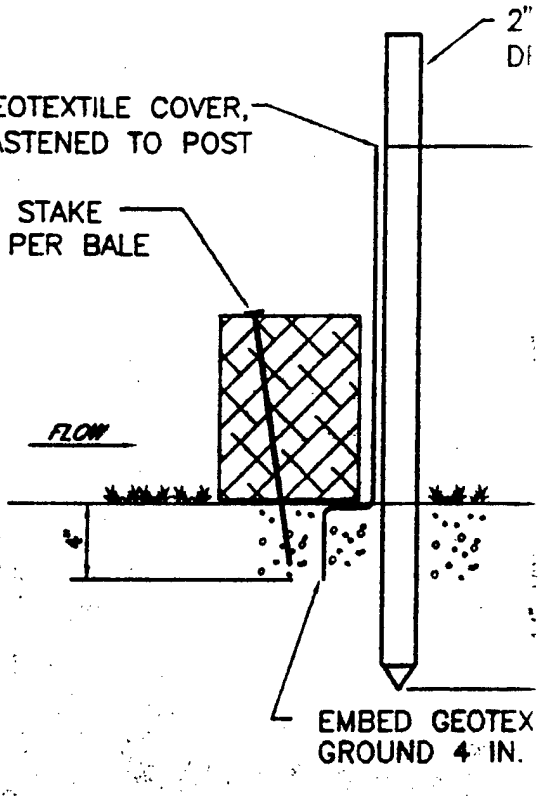
PaANG STATE COLLEGE
SITE 2 REMOVAL ACTION DESIGN

SOIL SEDIMENT REMOVAL
PLAN AND DETAILS

CUSHION

TYPICAL DEWATERING

NOT TO SCALE



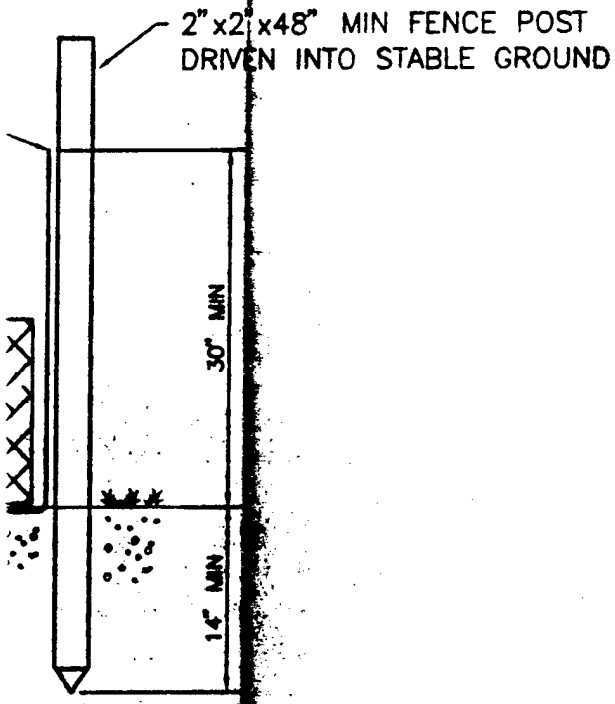
1 SILT FENCE

C-2 NOT TO SCALE

DATE: 12/4/97 (JTS)
FILE: H:\CAD\730472\30472C02.DWG
SCALE: PAPER SPACE 1=1
XREFS: NONE

— CUSHION GEOTEXTILE

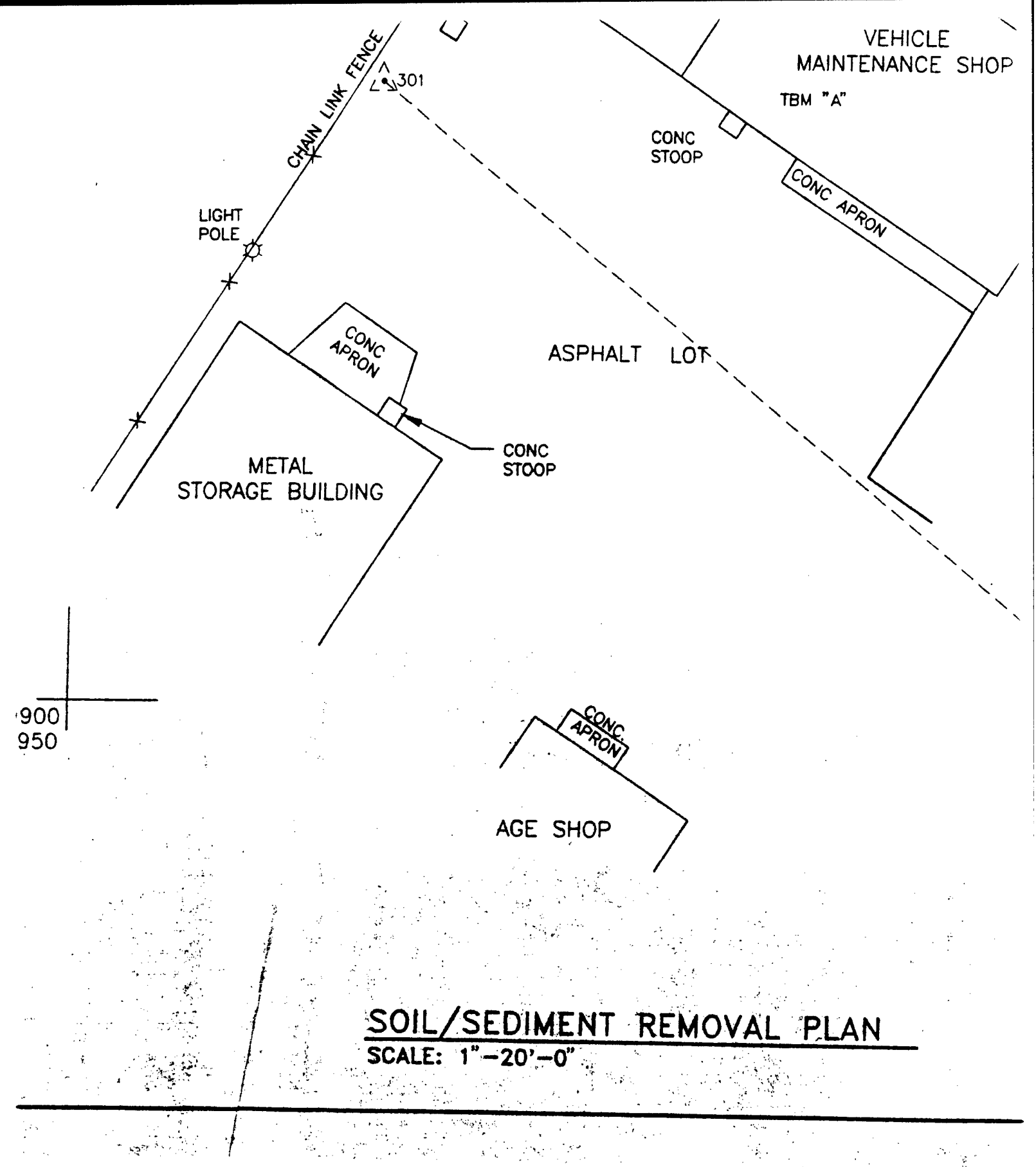
TERING PAD DETAIL



N 9900
E 9950

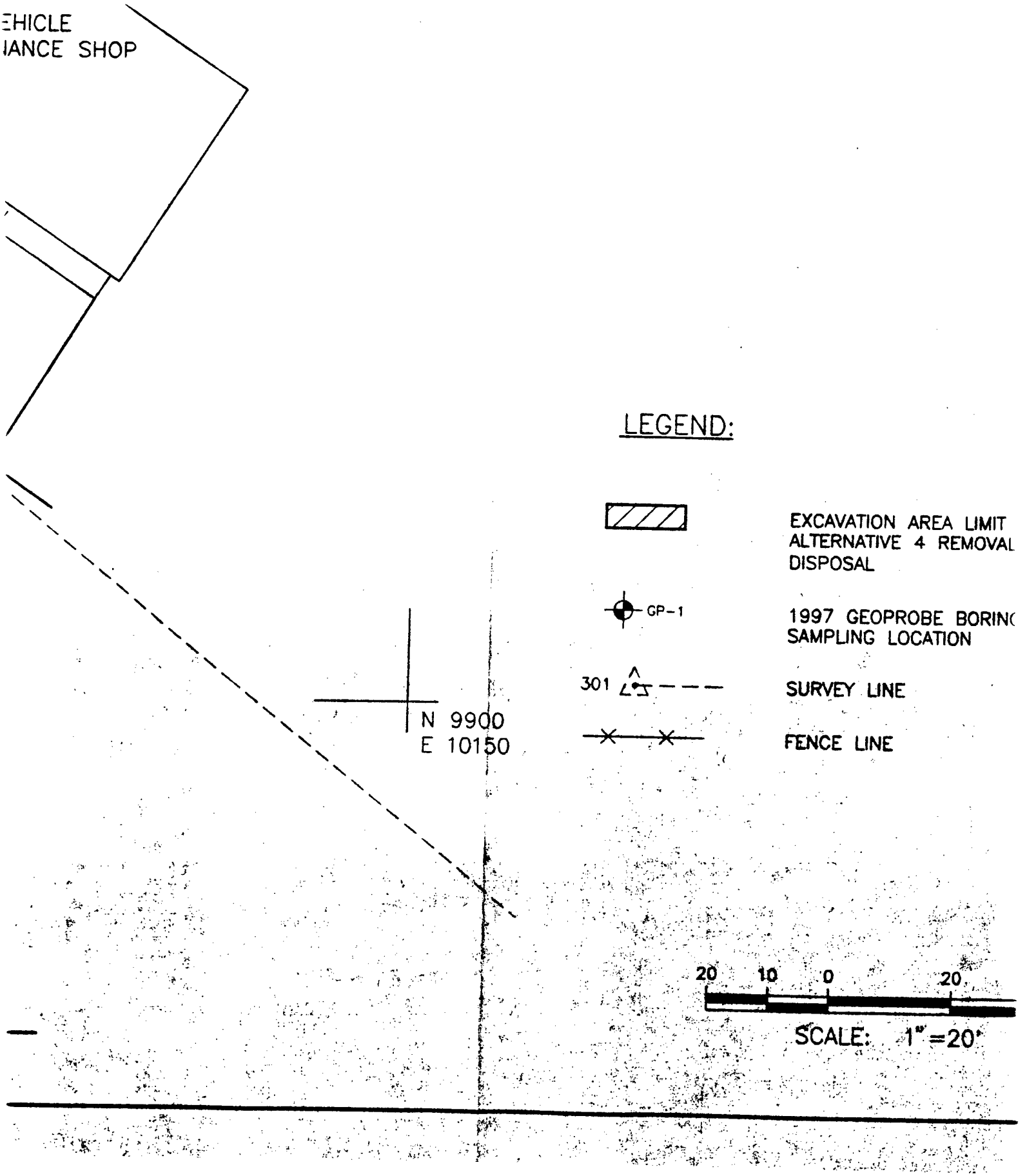
FENCE DETAIL

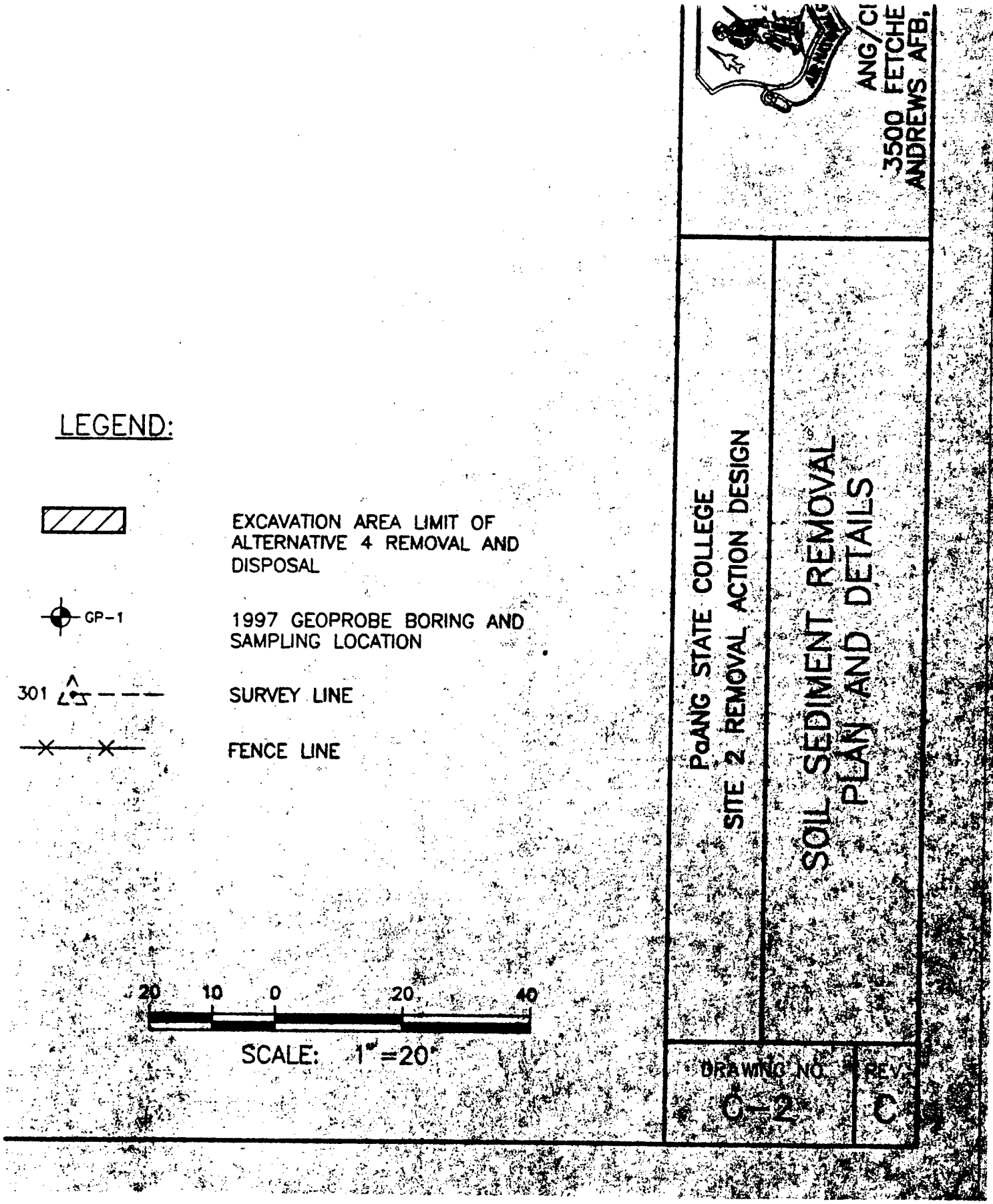
0 SCALE



SOIL/SEDIMENT REMOVAL PLAN

SCALE: 1"–20'–0"


EHICLE
IANCE SHOP
LEGEND:
EXCAVATION AREA LIMIT
ALTERNATIVE 4 REMOVAL
DISPOSAL
GP-1
1997 GEOPROBE BORIN(
SAMPLING LOCATION
301
SURVEY LINE
FENCE LINE
N 9900
E 10150
20
10
0
20
SCALE: 1"=20'


LEGEND:
EXCAVATION AREA LIMIT OF ALTERNATIVE 4 REMOVAL AND DISPOSAL
GP-1
1997 GEOPROBE BORING AND SAMPLING LOCATION
301
SURVEY LINE
FENCE LINE
20 10 0 20 40
SCALE: 1"=20'
ANG/CI
3500 FETCHE
ANDREWS AFB,
PaANG STATE COLLEGE
SITE 2 REMOVAL ACTION DESIGN
SOIL SEDIMENT REMOVAL
PLAN AND DETAILS
DRAWING NO.
C-2
REV.
C